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INSTITUTIONS INSTITUTIONS PHYSICK,

Collected from the

WRITINGS

Of the Most

Eminent Physicians.

By which the Principles and Fundamentals of that Art are digested and fully explain'd, as they relate both to the Theory and Practice; all which are establish'd upon the Mechanism and Structure of the Solids and Fluids that compose an Human Body;

WITH

An INTRODUCTORY PREFACE to the whole, and a succinct Account of the Authors made use of in this Work.

Being a complete System of what is necessary to be known in the Study of PHYSICK.

By J. BROWNE, LL. M.D.

LONDON:

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TO

Dr. William Maundy,

PHYSICIAN to the

Royal Hospital at Greenwich.

SIR,

S You recommended this Subject to me, I have us'd my Endeavor to render it intelligible. I confess it was a hard Task; yet the Pleasure I had in doing it, and the Use I am perswaded it will be of, to the Faculty, especially the young Students, makes me amends for the Trouble, but particularly this f paying a publick Acknowledgment

iv The Dedication.

Tears intimate Acquaintance first contracted in the same University and College, from which time we have

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both pursued the same Studies.

The learned Physician, I presume, will not think this an unacceptable Performance, considering the Author is very dry and consin'd in his Language, tho the Subject be so copious; so that it took almost as much Time and Application to translate, as it would have done to have compiled this Work; for a Man may be very well vers'd in the Latin, and yet not take his Meaning right at the first or second Reading, which tho it was a Discouragement to the Undertaking, seems to me a justifiable Reason for its appearing thus in English.

I know You will pardon smal Faults

The Dedication.

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faults, if You meet with the true Sense of this Author in a plain Stile, bo' now and then I am forc'd to make ese of more Words than he does, which are Words of the same Signification; this is done, either to render the Language freer and not so stiff as otherwise it must have been, or else to explain the Author's Meaning, and make it more easily understood. I need not mention this to You, (altho' by this I address my self to many) because You have considered the matter already; and I flatter my self, You will not be disappointed in Your Expectations. These Institutions of Boerhauve's

re a Treasury of Medicinal Knowledge, villected from the most judicious Physicians; but as they do not agreeable to the Nature of the Design, enter into the Pratice of Physick, I thought Imight without

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prejudice, nay, I doubt not but with some advantage, offer them to the Profession in this Dress: For I cannot conceive how such good Notions and solid Principles, founded upon mechanical and anatomical Observations, joyn'd to Demonstration with a judicious method directing all to Practice, can in any Language be a Dishonour to the Profession, altho' the Art was more universally known, and better understood, than it is at this Day.

I speak now to one who knows the Education of young Students in Physick abroad as well as at home, and on which side the Advantage lies: I bint not this to the Disparagement of our own Universities, which I stand engag'd to; but 'tis a difficult matter for those who are left to their own Studies to put themselves in a regular method,

The Dedication.

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thod, they may read till Dooms-day, and not arrive at a tolerable Judgment in the Profession, if they do not apply the Theory to the Practice and the Practice to the Theory; and this for mant of knowing how far Anatomy, Chymistry and Pharmacy are necessary, and how to adapt them properly.

Tis rambling Work to learn all these at second hand, or according to Mode, to go a Course of Anatomy, Chymistry, Botany, and yet know nothing of the matter, that is not experimentally, either how to work with their own Hands, or how to apply what they have seen or read. What useful Discoveries have we lately met with from the dissecting Anatomist? or what better methods of Cure from all his Discoveries? What efficacious powerful Medicine bath the Chymist found out for Gout,

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viii The Dedication.

Stone or Dropsy? What have all our Botanick Virtuosi discover'd to cure a Corn, or ease an aching Tooth? If this is not the end of our Enquiries, why do we enquire at all? Why do we not dully tread in the Steps of Antiquity, and never pretend to be better Physicians than our Forefathers.

I must not here forget to congratulate Your being plac'd in a Station, wherein You have an Opportunity put into Your Hands of doing Service to Your Queen and Country, by affording speedy Relief to those (otherwise miferable Creatures) who have undergone the Fatigues of a long War, and the Hardships of a Sea-faring Life, by which means they have contracted many deplorable and stubborn Diseases, which will not yield to common Treat-

The Dedication. ment; but You have employ'd Your Time so well in the experimental Part of Medicine, that You know the great Use and Advantage of a valuable one, and such You are Master of. Yet at the same time that You avoid the chargeable and (oftentimes) unsuccessful Rode of the common Methods, yet You pursue the only sase and true Way to suceed in Physick, that is, Observation and Experience, by which You arrive at the end the Great Hippocrates did also, viz. to cure cito, tuto & jucunde.

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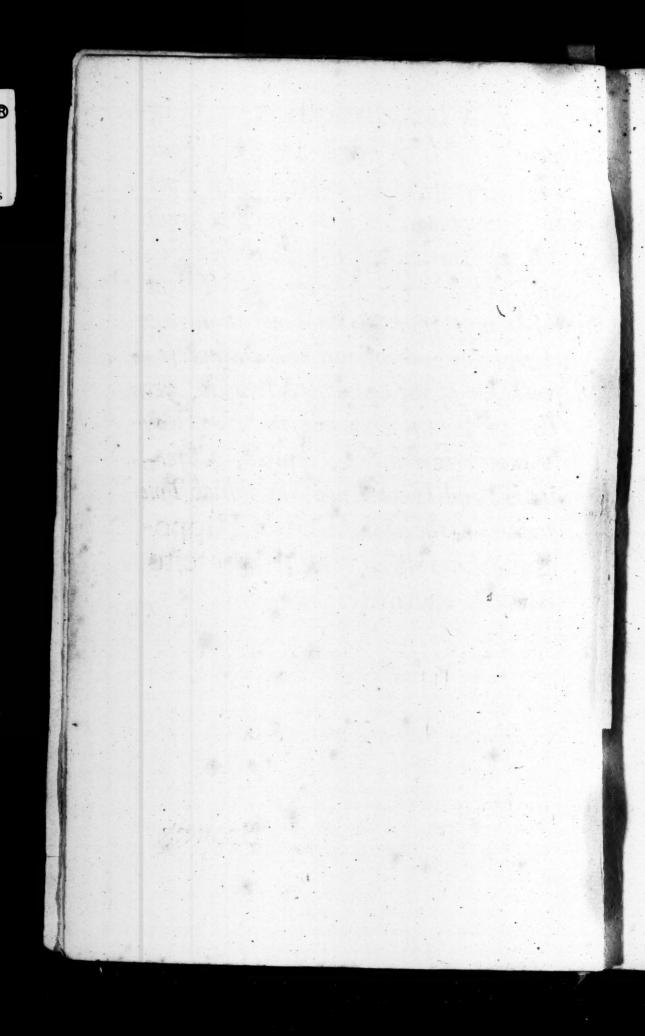
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I am, SIR,

Yours, &c.

J. Browne:



An Introductory Preface.

HE Art of Healing which is fo difficult to attain to, seems not yet to be fufficiently adorn'd with every thing, that is necessary for the exquisite Knowledge of a Physician, which will appear from these two reasons; first, from an imperfect History of Diseases, and a Want of faithful Observations in every Disease and every Sym-2ly, From clogging the Theory with so many uncertain Notions and Hypothesis; for how many almost innumerable Opinions have been and are daily broach'd in Physick? From whence arises so many Sects and Diffentions, that hath not only brought the Art into Contempt among Wife Men, but hath produced difficulties in Speculation, and dangers in Praclice.

Whoever therefore wou'd study to advance the Honour of Physick, must in the first place, endeavour to render whatever was difficult, more easie, the obscurer plain, the uncertain fix'd, and the Prolix shorter: In order to which he must add to Experience and Observation, a demonstrative Way of explaining, what he means

with clear Reason and due Connection, for the Advantages that arise from a well appointed and easy Method, in the most difficult Sciences that are taught and acquired, is evidently shewn to us in Mathematicks, Astronomy, and the new Method us'd in Botany of ranging Plants under their several Classes.

So that the like may be done in the Art of Physick, for if a Method was invented clear, short and demonstrative, that lays down known Principles, and makes the Connection of Causes agree with their Effects, it wou'd be easie then to discover the Truth and Simplicity of Physick,

both in Theory and Practice.

But first, as it is in other Sciences, we ought to make our *Principles* or *Fundamentals* certain and plain Demonstrations; because on them we must explain the Causes of Diseases and the Nature of their *Cures*, which is no more than

reasonable Philosophy.

What must we think then of the several Principles, which have been established in all Ages, as the Basis whereon to account for Diseases, and the Art of Healing. The Antients introduced the Elements and their four Qualities, from whence they derived their Temperaments; others have brought in Innate Heat, Radical Moisture, a Presiding Spirit, Astral Powers, Nature, &c. all which have been laid down as Fundamental Principles in the Theory of Physick.

The Moderns who endeavour to refine the Art by Fire, have fix'd their Principles upon Salt, Sulphur and Mercury; others again upon latent Seeds Seeds, Idea's, Archea's, occult Ferments, &c. but some pretend to account for all the Effects of Nature by Acid and Alcaly; many have formed an universal Pathology, from a Triumvirate of Humours, to wit, the Bile, the Pancreatick

Juice, and the Pituitary one.

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At this day, when Experimental Philosophy hath so much obtain'd, and the Phanomena of Nature are explain'd from the Figure of the Particles their Size and Situation; there are many will derive all the Causes of Diseases, from Acrimony, Viscidity, and Bile; but what Success there hath been in any of these Opinions Experience proves; for this way of learning the Knowledge of Physick, hath been the occasion of the wide Difference and Contradictions to be met with amongst Physicians: For 'tis evident, where things are not generally agreed on, we have just Reason to suspect, that the Truth is not yet found out, or at least not brought to Light.

Some have founded their Principles upon an Entity, which does not only produce natural Actions, but acts beyond Nature, and also frees the Body from morbifick Causes; but we assign the Cause of Action to be quite different here, and that it is perform'd without the Concourse of an Immaterial and Ideal Entity, but only by Corporeal Motion and Impulse: And this it is, this same Motion or Determination of Action that dispences Life and Health, procures Diseases and restores to Health again, according to the different degrees of Motion in time and place.

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These things are not placed in the Power of the Soul, but are evidently separated from it, as Experience daily teaches for the Motion of the Body, the vital Parts, Health and morbid Dispositions are not the Effects of the Soul, but things rather depending on meer corporeal Causes, as Air, Diet, Motion, and the Structure of the Solids, which vary according to Age and Con-

Aitution.

Notwithstanding all this, those very external and meer corporeal Causes, which dispose the Motion of the Blood, and modifie all the natural Actions after different ways, has a great Influence on the Soul it self, by constituting and ordering its Functions, Inclinations and Manners; the Functions and Operations of the Soul being different from those Motions which preferve Life and Health, and produce Difeases; in a Word from the Motion and Texture of the Blood, by which we have a curious Natural and Geographical Observation, that as there are different Situations or Regions to the Poles or to the Aquator, so Men, according to the Structure of the Body, Strength, Disposition of Diseases, long Life, Fruitfulness, &c. have their Wills. natural Inclinations, Vices and Manners diffinguish'd.

But the Soul, whose Duty it is to perceive, direct and make a Judgment of the several Motions of the Body among one another, and from thence to form Impressions and Idea's, does act differently in Cogitations, by Virtue of that Union between Soul and Body, this kind

of Motion of the Soul's is liable to be disturbed and molested several ways, as by the many Phantasims and Passions of the Mind; notwithstanding which, the Soul does neither directly nor proximately move the Fluids of our Body, and perform Secretion, Excretion and Digestion; for which reason it can never be admitted as a Fundamental.

A Fundamental Principle ought to be Natural, and therefore Mechanical, arising from Matter and Motion, or the Disposition of Body to Motion: For all Actions, as in the Macrocosm, where all things are dispos'd in Order, so they are in the Microcosm, a Species of Motion, and the Cause of them only to be found in Motion. But it is evident to Reason as well as Experience, that Motion is innate to all Bodies, but that the subtiler Bodies are swifter, and the solider move with greater force, by which means one acts upon another.

But those Motions which are perform'd in certain Order, certain Proportion, and certain time, are regular Motions, and only depend on the Artificial Structure, Disposition and Proportion of the solid and fluid Parts to Motion, which being alter'd by external and mechanical Causes, make Irregular or Diseas'd Motions, which being restored by Diet and Medicines,

are reduced into Order again.

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Therefore Hippocrates wisely held, that Nature was the Physician and Healer of Diseases, that the Soul never ought to be admitted as the Foundation of any thing in Physick, and what

rch tions the Antients ascrib'd to Nature we do to the Structure of the Solids and Motion of the Fluids.

Hence an universal Principle may be establish'd, from whence the Actions, as well Natural as Preternatural, may be accounted for from this Spring, as from a Fountain Head; and all those things which happen in the Cure of Diseases and the Operation of Medicines. For the Motion of the Blood depends on the Motion of the Systole and Diastole of the muscular and moving Fibres, as also on the Temper of the Fluids and their Quantity. But the Motion and Impulse of the Solids is no Immaterial Ideal Entity, but the most subtil material one that can exist, and this is that Catholick Fluid, which is the most active from its Elasticity or spring of subtil etherial Air, which the Antients call'd their Anima Mundi, we the Breath of Life.

For as this Subtil Elastick Air is exhaled or drawn off from the Juices of the Body, so Life perisheth; a vitiated Air disturbs both the Body and Mind, in the Performance of their Functions; therefore it is, that from a serene and pure Air the Body enjoys longer Life, and is less subject to Diseases; nay, it is more easily relieved and cured in the most difficult Distempers, to the better Understanding of which, I shall premise two or three things briefly, concerning Life and Death, Health and a Disease,

on which the whole Structure depends.

Life in the Organical Body does not properly and fingularly denote its healthful and uncorrupted State, but as it hath been received in

all

all Ages, it imports a certain Action, which in

Physiology is no other than Motion.

Therefore Life is a constant Progress of the Fluids by certain Pipes or Vessels, assisted by the Impulse of the Solids, preserving a corruptible Body from Decay; so long as such a Motion is in being, so long a Part or the whole Body is said to live, and is free from Corruption; but as this Motion is interrupted so as not to be restored, the Body is said to be dead; but so, that Corruption and Putrefaction does not immediately follow; as we see in Persons strangled, and those who are suffocated with Water, or that perish with Cold, whose Hearts or great Vessels are fill'd with Blood that stagnates there.

But if Death ensue from the Violence of a Ditease, this proceeds from a desicient Motion of the Blood, upon which there immediately sollows a Disposition and Tendency to Putrefaction; so that it can scarcely be imagined what Corruption exhales from Bodies in Fevers and the like; for this Motion of the Blood preserves the whole Body from a State of Corruption, which it would otherwise be subject to.

And altho' this Motion be circular, it is also intestine, which arises from the Motion of the spiritualizing Parts, which defends the Blood and all the Fluids of the Body from another Action of external Air, and gives it a different Texture. For by means of the Resistance of this intestine Motion, spirituous Liquors and generous Wines are converted or

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chang'd by the Fluid of the Air into a vapid and infipid Body. Besides the Progression and Pressure of the Blood thro' Strainers of different kinds, separates not only the subtil, airy, active Element, but also the serous, impure, saline, sulphureous Parts, which of their own Nature break through and tend to Corruption, for so long as the Fluids are kept in Motion, so much less are they subject to be broken.

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Having given the reason of Life and Death, it follows from the same Spring, to wit the Motion of the Blood, that we should explain the Nature of Health, which does not simply consist in the circular Motion of the Blood, which is also in Sickness; but it is found in a certain Order and Regularity of this Motion, in a moderate and free Progression of the Blood, assisted by the Pulsation of the Heart and the very Tone of the Fibres, or from the Equality of the Motion of the Solids and Fluids.

This Equality governs all Actions according to that Order and Law, that was first appointed by the great Creator; in perfect Health, the Soul reasons right, the Senses are vigorous, the vital Motions necessary, Secretions and Excretions are duly perform'd by their proper Emunctories, Sleep, Appetite, Digestion and Nutrition, are all natural and pleasant.

But how this regular Motion of the Blood affects the Government of the Body, we shall more particularly enquire into: There are three Sorts of Parts in Animal Bodies, the Movers, the Parts moved, and the Way or Vessel by which

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which there is a Motion of the Fluids: The Movers are the Heart and muscular Fibres of the whole Body, made up of sensible Membranes, and fleshy or carnous Threads, strengthen'd by the Fluid of the Elastick Air in the Blood, which the Antients call'd Spirit; these animated Fibres as I may call them, fitly adapted for Motion by their Constriction or Systole, impel the Fluids of all kinds thro' their Vessels, and these moving circularly, support and nourish the particular Parts of the Body; the Part moved are the Fluids, the Blood with its Serum and Lympha, together with whatever Humours arise from them; the Ways by which they move one way or the other, are first the Arteries, which bring Blood from the Heart as the Fountain or first Muscle of Motion, then the Veins and lymphatick Vessels, which convey Blood and Lympha.

Now every Man may easily conceive, how a moderate and free Motion of the Humours, requires a moderate and equal Impulse of the Solids; that is, not too swift and violent, nor too slow and weak, but which keeps Proportion by just Intervals; from hence a proportionable Quantity of Humours is required for the Vessels and for the Strength of the Fibres; besides this, a due Proportion of Elements, such as are necessary to temper the Fluids, which compose the Blood: Again, the Passages or Vessels ought to be free, that the Blood may pass thro

them without hindrance.

If all these Things are dispos'd right, the Motion of the Fluids through the Canals and Ducks of the whole Body will be regular, smooth and equal, which is the Perfection of all Actions, that are perform'd in us according to Nature. But because the impelling Parts or moving Fibres to impulse, particularly relate to the Circulation of the Fluids, it will be necessary that we form to our selves clear and distinct Notions concerning this Impulse and Motion; viz. that we assign the first Place to the Heart, as the primum mobile, the Prince of the Muscles, the first Impeller, and consequently the Fountain of Life.

This Noble Muscle triumphs over all the rest. as having two different Motions, upon which all the others depend, the one is active from the elastick Fluid, existing in the Fibres, which is call'd the Systole, for by this means they are contracted and straitned, and so the Fluids lodging in their Cavities are propell'd and driven forward, the other Motion of the Heart, to wit, its Diastole is passive, because the Fibres are relaxed and dilated from the Impulse of the Blood into its Cavity: Therefore the Blood is received by one Motion, and expell'd by the other, from the Blood's being puls'd out of the Heart, the Arteries are dilated, but contracted from the proper elastick Fluid of the Fibres. by which they protrude or thrust forward the Blood into the Veins; but the Dilatation of the Arteries from the Blood being impell'd into them from the Heart, is by the Physicians call'd the the Pulse, by way of Eminence or Distinction, for you can scarce perceive the Systole by any

Sense of feeling.

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Besides this Pulse and Motion of the Arteries, the venous, arterial and lymphatick Ducts are confirm'd by that Motion, which exists in every Species of the Systole, and is call'd the Tone, as the turgid Fibres in the elastick Fluid of the Nerves and Blood, not only promote the Circulation and Progression of the Fluids by their Strength and Retension, but by a certain subtil Impulse; again, the Fibres are also confirm'd in the Motion of the Diastole, which is made from the Impulse of the Blood by the Heart, extending and dilating the Fibres, which if the other cannot refift, to wit, the Tone and Strength in the Muscles, the Expansion of the Fibres is then beyond their Spring, and the Progression meets with an Impediment.

Therefore these two kinds of Motion, viz. a Pulse which exerts its Power in the Vessels and the Heart, and drives from the Centre to the Circumference, and the Tone which is seated in all the Fibres, membranous and muscular Parts, and moves from the Circumference to the Centre; if these are in a right State and in due Strength, Equality and Temperament, the Blood is received into the Parts equally and without Impediment, and from the same, a due Quantity is expell'd in due time, the Secretions naturally follow, and so the Business of Health

is perform'd.

A Constitution or Temperament of Body, physically consider'd, is nothing else but a particular or distinct Motion in different Persons; for when the Blood is swiftly and violently moved, and is too sluid: This, according to the Antients, was call'd a cholerick Constitution; if less sluid and the Motion slower, melancholick; if weak and languid abounding with serous Blood, slegmatick; if the Blood was too plentiful and mov'd briskly thro' the

Vessels, then sanguine.

This Variety of the Motion of the Blood depends not so much on the Quantity and Size of the moving Fibres, but on their Strength and Vigour; and therefore consequently on the Pulse and Tone; in the next place, it depends not on the Substance and State of the Blood, the Plenty of the Vessels, their Capacities and Condition; but as an hereditary Disposition, Age, Sex, Climate or Air variously affect and alter this Temperament of Humours, the Contraction of the Fibres, the Strength and Habit of the Vessels, so the Motion of the Blood differs, that it is never one and the same in the same Man, at all Times of the Year, under all sorts of Diet, and in every Climate.

But because the Motion of the Blood is so various in various Persons, hence is observable, that Difference in Constitutions, as to Appetite, Excretions, Pulse, Strength, morbid Inclinations, Dispositions of the Mind, and

other things of the like nature.

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Having succinctly explain'd the Reason of Health, it will be easy to descend into the Origine and Cause of Diseases; for the same fundamental Principle from which we deduced the reason of the former, may serve for an Explanation of the latter. For as the very Being of Health consists in a moderate, free and equal Motion of the Blood, or in the Equality of the Pulse and Tone of the just Temperament and Quantity of the Fluids; fo the Seat of every Disease, and the immediate Cause thereof, is placed in the Motion, as it is immoderate, obstructed or unequal, by reafon of the lost Distinction of the Pulse and Tone of the Solids, as also the Intemperament and Disproportion of the Fluids.

Health is formally the Use or Exercise of all regular Actions, but in a Disease this Exercise is either lessen'd, interrupted or totally destroy'd, for there is none, in which either the vital, animal or natural Actions do not fuffer. Hence it is, that in every Disease, either Appetite, Digestion, Pulse, Respiration, Nutrition, Sense, Reason, the Secretions or Excretions are wanting: But as the ordinary Motion of the Blood directs its Actions nearest to Nature; so on the contrary, the inordinate Motion is the Parent of all irregular Actions in the Body; for a disorder'd Motion attends all Fevers, Inflammations, Hemorrhagies and Spasms, and a changeable Pulse, Alteration of Heat and Coldness, a Collection of Blood in any Part, vicious Excretions are the Sign 1-A 4

Signatures. For the Parts are too hot or too cold, the Body too much contracted or relaxed, the Excretions too plentiful, not enough, or else irregular, the Pulse too quick or too flow, Respiration increas'd or abated; these things sufficiently shew a disorder'd and anoma-

lous Motion of the Blood.

Besides, there are chronick Distempers where the Motion of the Humours are obstructed, and where a Relaxation of the Fibres does not attend, and this is plainly demonstrated in Tumours, Extravafation of the Fluids, and the Suppression of necessary Excretions: And this may be derived partly from a lost Tone of the folid Parts, and partly from an undue Proportion and Mixture of the Humours: The Motion of the muscular Parts makes up both the Systole and Diastole; the Systole is injured when it is too strong, violently contracted or wound up fo as to force the Spring, and then it is call'd a Spasm, or rigid Contraction: The Diastole is hurt, when it is dilated beyond its natural State, and then there attends it an Inability to Action from its Relaxation or Weakness.

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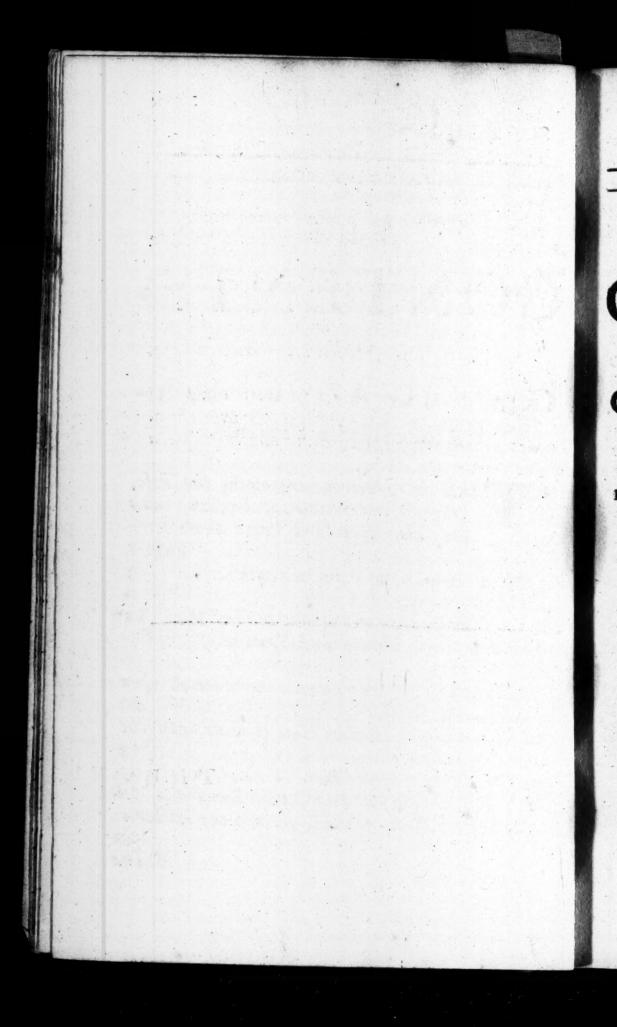
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INTRODUCTION,

Containing the Rise, Progress, and Success of Physick.

Hoever can exercise the proper Actions of Lise with Ease, Pleasure, and for some Certainty of Time, may be well esteem'd a sound or healthful Man; and it is this State or Condition only that deserves the Name of Health: But if he cannot perform these things, or at best does them with Trouble, Pain, and Weariness, the same may be call'd a sick Person, and the Condition he is in, we are us'd to term a morbid State or Disease.

But Injuries from Accidents and the unavoidable Vicissitude or Change of things, which are always necessary, as Air, the Quality of Meat and Drink, the Force of external Bodies, the Actions of Life, and lastly, the Fabrick or the Composition of Human Bodies have render'd Diseases coequal with Mortality, as long as we enjoy Life under the Necessity of that Law. Indeed Diseases by a mechanick Impulse force the Body to apply some Relief in Men as well as Brutes, tho' Reason cou'd never yet direct us into the manner of it; which would otherwise be unknown; which by Observation we find to be true:

The troublesome Perception we feel in some Member or Limb being obstructed in its Motion, or the Pain and Torment we perceive in some Part hurt in its Action, strikes the Mind with a Desire to seek for, and apply such apt and proper Remedies as may remove its Grievances, either from uncertain or confus'd Experience, or something it is

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prompted to, by natural Inclination.

This at first gave Birth to the Art of Physick, and this with daily Improvements was always and in all Places amongst Mankind: But the Monuments of Antiquity, as well solid as fabulous Historians inform us, such as Herodotus, Strabo and Pliny, that the Assyrians, Babylonians, Chaldeans and the Magi sirst cultivated this Art, in order to cure the present and prevent suture Diseases. Hence the Art spread it self according to Homer in his Odysses, and Diodorus Siculus into Egypt, then as Herodotus writes into Lybia Cyrenaica, from thence to Greece, as Hippocrates witnesseth, where it sirst slourished in the Islands of Cnidos, Rhodes, Coos, and Epidaurus.

The first Foundation of the Art was built upon Chance, natural Instinct, or unforeseen Events. which was afterwards improv'd; first, from Memory, or the Recollection of what Success they had from former Experience. 2ly, From describing the Disease, Remedy and Success, which, as Pausanius takes notice, was wrote upon the Columns or Pillars, Strabo fays upon Tables or on the Walls of the Temples. 2ly, From the Description or Account of the Sick themselves, who, both as Herodotus and Strabo mention, were expos'd in the Streets and the Market Places, to ask of any that pass'd by if they knew of any Remedy that wou'd cure them, as likewise to advise them to the Use of it. 4ly, From Reasoning, and comparing of Observations with what was present, and what

cou'd be expected hereafter, which is call'd the

Analogical Part.

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Hence the Art arose to a greater Persection, first from the Application of the Physicians, as Aristotle observes, as well to certain Diseases, as to particular Remedies. 2ly, From the accurate Annotation of Diseases: 3ly, The exact Observation and Description of Medicines and their singular Uses. But this presently got into certain Families and among the Priests, who made no small Prosit and Advantage of it to themselves; and this soon put a Stop to the Progress and surther Advancement of Medicine at that time.

The examining the Entrails of Beafts by the Priests; the Method of embalming and preferving of Dead Bodies, even the killing of Meat for the Shambles, have much promoted the Knowledge of the Structure of a sound Body, the secret and hidden Causes as well of Health, Diseases, and even Death it self; lastly of all, Live Dissections of Animals in use amongst the ancient Philosophers, as Hippocrates writes in his Letters to Damagetus. 2ly, Lectures or Readings upon the distinct Causes of Diseases, their Rise, Increase, Heighth or Strength, Declination, Period, Change or Essects. 3ly, The Knowledge of Medicines, their Choice, Preparation, Application, known Virtues or Observation upon their Essects, seem to have render'd the Work persect.

But Hippocrates, who was contemporary with Democritus, and who was perfectly vers'd in all these things mentioned as necessary to the Art, and having added thereto his own judicious Observations, compiled there from a Body of Greek Physick, because as he understood the Emperical and Analogical Parts, and being an exquisite Philosopher, he establish'd to all succeeding Ages, that which is call'd the dogma-

tick Phyfick.

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Which continuing a long time among the Descendants of Asculapius uncorrupted, was at last digested into one common Body by Aretæus the Cappadocian; which being in various Parts, was by diverse Artificers at different times, according to the Success of things accurately wrought up, at first in the Alexandrian School, 'til at last it came to Galen's Hands, who collecting the scatter'd Pieces, digesting the confus'd, and explaining all the rest by the peripatetick Dogma's or Opinions, he enrich'd himself, but impoverish'd the real Art of Healing, by adding more Difficulties thereto, and clogging Medicine by his subtle Innovations of Elements, Cardinal Qualities, and the four

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Humours.

But the Memory of these things being almost worn out with other Arts in Europe after the Sixth Century from the Ninth to the Thirteenth, Physick was more subtilly improv'd by the Arabians in Asia, Africa and Spain, whilft the Materia Medica, the feveral Preparations thereof and Chirurgery received many Additions and Corrections from them together; but tho' the Faults of Galen were rather cherish'd and improv'd than banish'd from the Art, yet every body follow'd them, 'til by Emendations and Refutations, there was a Medium fix'd upon betwixt the Two Extremes, and the Discipline of Hippocrates gain'd a mighty Restoration by the French Physicians, who added therero Chimical as well as Anatomical Experiments; 'til the Immortal Harvey by his Demonstrations that overturn'd all the Theory of those that went before him, laid a new and almost certain Basis to make Physick a Science. Hence at this Day, it is rever'd as free from all Sects, whilst it is promoted and improv'd by certain Inventions or Discoveries, in Anaromy, Botany, Chimistry, Philosophy, Mechanicks, and the Productions of Art which is made use of in the various Experiments. From whence

whence lastly it follows; first, that the antient Art of Medicine depended solely on the saithful Collection of Observations. 2ly, That they employ'd their Faculties in exploring the Causes of Experiments, and enter'd into a large Field of Argumentation, or Disputes about the Rationale; so that, 3ly, the sirst Part was not so sallacious, but always appear'd the same from Evidence, Use and Necessity, but the latter was doubtful, uncertain and changeable, being liable to be controverted or evaded by the Variety of Opinions in every different Sect of Philosophers.

The Principles and Parts of Physick.

From the useless and fallacious Part this Science receiv'd many things, which as they are to be rejected and thrown aside, we are to consider, the whole Scope or Design of this Art is to free or deliver us from Pain, Sickness and Death; and consequently is instituted for the Preservation of prefent Health, and the Restitution of that which is loft; and therefore whatever is to be learnt and perform'd by the Physician, is to answer this End. For the Life, Health, Diseases or Death of Mankind is the Object thereof; the Causes thereof, from whence they proceed, and the Means by which they are govern'd: From whence Medicine becomes the Science or Knowledge of those things, from the effect of which Applications a healthful State of Life is continued, and the Sick restored to their former Condition; fo that the Nobility, Usefulness, and Necessity of this Art naturally discover themselves,

The folid Fundamentals or Principles are to be discover'd two ways, to come at a Certainty: first, from an accurate Observation of those Phanomena, which appear in Health, Sickness, Death a Cada-

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ver, or else to the external Senses; whether they arise from what is in the Man himself, or from those things which act upon him by external Caufes, Accident or Art. 2ly, From a severe or exact Scrutiny into those things which lie hid from our Senses, or are perform'd for some certain End. But these things can only be obtain'd by correct Reasoning, while the Experiments laid down, are diffinctly examined in all their feveral Properties, from thence diligently compar'd among themselves, as agreeing or differing, while at the same time they are faithfully set down, that we may be able afterwards to find out what appear'd plain and evident therein; and in this particular, those of the present Age are not less to be depended on than Antiquity.

Therefore that what is enquired after, may be discover'd from what is laid down; certain Principles are requisite, the Knowledge of which amounts to a Demonstration; which Reason requires should be distinct, clear and certain: Such are those which being purely corporeal in Man, are only mechanical and physical Experiments; for these explain to us the general and particular Force and Operation of Bodies. But since there are in Men other things which cannot be understood by those Principles, and therefore not to be explain'd by Demonstration, it will be necessary to use our utmost Reason, if we wou'd avoid Mistakes, but he may easily see that, that considers the following things otherwise demonstrated, and admits as Truths.

First, That Man is composed of Soul and Body united. 2ly, That these two Natures differ from each other; and 3ly, That he hath a Lise made up of different Actions and Passions: 4ly, That these soach among themselves, that the singular or particular Thoughts of the Mind are joyn'd to the determinate Conditions of the Body, and so vice versa.

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sly, While some Thoughts follow from one simple Thought alone, others are only derived from the alter'd State or Condition of the Body: 6ly, Likewife contrary to these Operations, some make a certain Motion in the Body without Attention, Selfconsciousness or a Command of the Soul affifting them as a Cause; but there are none raised by the progressive Actions of the Mind, as long as a Man is in a healthful State; laftly, some Concretes or Complications are observ'd from both these. 7ly, Whatever involves the Thought of Man, that only is to be ascrib'd to the Mind, as the Author or Beginner. 8ly, But that which procures Extension or Motion, that is applicable to the Body only, and its Motion as the Producer of it by its Properties, and so ought to be understood, explain'd and demonstrated. 9ly, Neither can Reason fathom from the clearest Nature of the Mind or Body, so far as yet is known to Human Understanding, what things can act or be acted upon mutually with each other.

The utmost or last Result of Metaphysical and Philosophical Causes, inquir'd into by the Physicians, are not necessary, useful or possible. So that he shou'd make Elements, or establish the Origin of the first Form of Seeds and Motion, but he may profitably apply himself to all things that are demonstrable in Anatomy, Chimistry, Mechanicks and natural Philosophy, so far as relates to the simple Events of Facts. Then he ought to begin with things that are most plain, easy to be known and most certain, from which always going forwards with those which are in the next Degree, he may make such an accurate Progress, as to be able to find out such things as are more complicated, obscure and difficult. So let him proceed instructing from Generals to Particulars, 'til he fo explains his Discoveries, that the Inventor may proceed from Par-

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Particulars to Universals; on all which, method will depend, first we are to enquire into Life, then Health, next Diseases, and last of all Medicines

whereby they are cured.

Therefore the first universal Doctrine in Physick is what we call Institutions, and this explains, first the Parts or Fabrick of a Human Body; 2ly, Life: 3ly, Health: 4ly, The Effects which naturally follow, and this is call'd the Physiological Part, the Human Oeconomy, or the Doctrine concerning the Use of the Parts; but the Objects of this Part, as they are reckon'd in Method are usually term'd, the Naturals, or those which appear according to the Course of Nature.

The next Part hath relation to the living Body, as first, Diseases: 2ly, The Dissernce of Diseases: 3ly, Their Causes: 4ly Their Effects; which is called the Pathology, because it treats of Diseases, or the Pathological Aitiology when it treats of its Causes Pathology or Nosology, if concerning the Dissernces thereof: Or lastly, Symptomatiology as often as it explains the Effects thereof. The Objects of this part, are those things which are preternatural or contrary to Nature.

The third Part teaches us the Signs of a Difease, and how they are reduced to Use; either in a healthful or sick Body, as to what the State or Condition is, was, or will be, the Degrees, Order and Effect of Health or Sickness, and this comes under the Denomination of the Seimeiotical Part; the Objects of which are the things call'd Natural, Non-

natural and Preternatural.

The Fourth shews us the Remedies and their Use, by which Life and Health may be maintain'd, from whence it is term'd Hygeinial, and hath for its Objects the Non-naturals.

Lastly, The Fifth Part instructs us in the Materia Medica; the several Preparations of Medicines,

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and the manner of using them in order to restore Health, and free us from Diseases: This is call'd the Therapeutick Part of Physick, containing the Diatetick, Pharmaceutick, Chyrurgick and method of Cure. Therefore we shall proceed according to this Order laid down and begin with the Physiological Part.

Of Physiology.

THE Human Body is compos'd, as Anatomical Enquiries teach us, of Solids and Fluids: The Solids are, either Vessels that contain the Fluids, or Instruments so formed, configurated and connected, that certain determinate Motions may be perform'd or exercis'd from this single Fabrick, if any moving Cause concur. For there we find Supporters, Pillars, Clothing or Covering, Partitions, Rollers, Wedges, Leavers, Pullies, Cords, Presses, Bellows, Sieves, Strainers, Canals and Receptacles. The Faculty of exercising these Motions is call'd a Function, which is agreeable to the Laws of Mechanism, by which only it can be explain'd.

The Fluids as mention'd before, are contain'd and mov'd within the Solids, and in Motion are determin'd, mix'd, separated and chang'd; the Vessels move with the Instruments tyed to them, the Sides of which rub against each other, change, and return to their Place again. These Actions are perform'd according to the Hydrostatick, Hydraulick and Mechanick Laws, and therefore ought to be explain'd thereby; yet so that the most accurate Reason may be given of each Humour and every Action, that can be required in any kind of Experiment.

By the Nature of Human Life, to be underflood here according to common Acceptation, I mean

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mean such a Condition of the Body, as to Solids and Fluids, as is necessary at all times to maintain and carry on a mutual Commerce betwixt the Soul and Body, so that it may continue after some fort or another, or may be restored in some measure; neither is it necessary to be wholly broke or interrupted: But I will not pretend that this is a true Definition of Life, or that I cannot give a clearer Idea of Health than what is laid down before.

But that we may nicely understand, what is requisite in the Body, that these Two may subsist together. First, We are to make a curious Collection of all the Phænomena of Life and Health. 2ly, Enquire into the Subjects in which these are. 3ly, Examine the Causes from whence they proceed. 4ly, The Instruments by which they are made; and 5ly, The Effects which they do produce

again.

But since these are almost innumerable, for Method sake we ought to reduce them to certain Heads, that we may treat distinctly of each of them in order. But first let us begin with Corporeals, which are common to Man and Woman, or proper to either; and since all things so cohere amongst themselves, that they move as it were in a Circle, causes and effects acting by mutual turns, whence arises an unavoidable difficulty to find out the order thereof, without transgressing the Method.

Yet the best appears from beginning with the Aliment taken in, and then going forward through the successive changes of those things in the Body, till it ends where these very things make the Body it self, and its Actions; for how the Body exists, or is supported from the things it receives, first known to sense, and continually chang'd, and how it acts by the same, will be most easily and clearly discover'd after this manner. The

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The Aliment or Food therefore, is either folid or liquid, and consequently either eatable or drinkable; the primæval matter of which was Water. and from that, what Earth spontaneously produced. as facred, profane and fabulous History inform us, nay as we may discern from the very nature of the thing it felf: Afterwards the Blood of certain Animals, and other parts of them were used to be prepar'd or dress'd together, with such eatables as the Earth afforded; while many, as Herodotus fays from all Antiquity, liv'd only of Vegetables and Water, which some do to this day; and whole Nations have been contented to live thus: But Tulpius tells us, he saw a Man that liv'd of Grass and Hay: Others feed upon Fish only, some Flesh and Milk. while others eat all kinds of things, as Fish, Flesh, Fowl and Reptiles, which Luxury and Gluttony have brought into vogue, and which in all Ages of the World hath been practiced. Therefore with every one of these things alone or mix'd, crude or prepared, raw or dress'd, the Man that uses them lives, grows and is refresh'd: Neither does the variety of Aliment produce any great difference to the nutrition of the Body, either as to matter or action, what then is the faculty in a healthful Man, which from changing such varieties can constitute a Human Body?

Nevertheless, the use of things teaches us this change is better perform'd according to the variety of the Food, or the difference of the Preparation from whence these were subject to alter before they enter'd the Body. Hence ripe Corn, dress'd and ground, mix'd with Water fermented and boil'd by the Fire, is best for the preservation of Health: So the parts of Animals after being clean'd, dry'd, pickled, boil'd, roasted, broil'd, or the like, experience teaches us are fitter for use; Salt, Vinegar and Spice afford us the particular Materials for Sawce, and are

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the Basis of all Pickles or other Preservatives for Meat. Summer Fruits, if ripe, that is foft eafily melt or dissolve, so that they need no other preparation or affistance. But Drink if from a pure Water and running Stream is best crude or raw; if the Water is foul from Infects, or their Eggs floating therein, gently boiling or letting it stand for a time renders it better; but Drink made from Corn or Fruits boil'd in Water is known to be good: As that which is made from Malt, by fleeping in Water, then boiling, fermenting and fining it down, which we call Ale or Beer; neither is the reason less clear and evident from the making of Cyder from ripe Summer Fruits press'd, then fermented or work'd and afterwards fin'd, which hath been fo extoll'd by the celebrated Name of Wine: from all which Preparations proceed, attenuation, dilution, lubricity, fluidity, the separation of the thin from the thick, and confequently we may naturally conclude the feparation and excretion of the fluids is easier perform'd in the human Body.

Of Manducation or chewing of Victuals.

THE Food being thus chang'd as hinted before, ftill undergoes further Alterations in the Mouth, which are made first from biting: Secondly Mastication: Thirdly a Mixture of Air with the Mucous and Saliva: Biting requires the Opening or Abduction of the Inferior Jaw from the upper towards the Throat, directly upon the Condyliforme Process, under the prominence or rising of the temporal Bone, by the help of the Ligament and Interposition of the cartilaginous Lamella articulated thereto, as Vesalius hath describ'd it. And in the next place, Biting requires a strong Compression of the lower Jaw against the upper; so that by the Teeth being

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being plac'd betwixt, the Food may be cut or ground. The First Action is perform'd by the Contraction of the Biventrian Muscles, according to Casserius, which arising carneous from a small Trench indented or funk into the Basis of the Mastoide Process, descending as Vesalius says, they make a Tendon, from whence they pass by the Stylobyoide Muscle and the Annular Ligament, cleaving to the fide of the Os Hyoidis, from whence they become carneous again. and being supply'd with fleshy Fibres from the very Os Hyoidis; they ascend even to the very inward middle and lower part of the Chin, and are there inferted: So that by this piece of Mechanism the Strength and Direction or Tendency of these Muscles are understood, not without great Admiration at the artful Fabrick.

The latter Action which consists of bringing the Jaws together with force, is perform'd by the Contraction of the Temporal-Muscles, says Vesalius, which being united with a large femicircular carneous Origine from the hollow of the Os Frontis, finks into the Sphenoide and Temporal Bone, together with the Fibres running under the Os Jugale, which being strengthen'd and determined by the Fibres taken from thence; they become all about tendinous, but as yet carneous, on every fide of the Coronoide Process of the lower Jaw; the Masseters which says Vefalius are carneous, and arise thick from the First Bone of the lower Jaw, and the Jugal Bone, here croffing their Fibres, they mutually infert themselves into the inferior, and exterior Margin or Edge of the lower Jaw, from the point or corner of the Chin, for near four Fingers breadth. The external Pterygoides which Fallopius and after him Verbeyen remarks, that arise from the outward Part of the exterior Wing of the Pterygoide Process, in the Sphenoide Bone, and the upper Part of the same Sphenoide Bone, running backwards are inferted by a strong Tendon, in the femilunar

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femilunar Space, situated in the internal Part of the lower Jaw, betwixt the Condyloide and Coronoide Process: The internal Pterygoides, according to Fallopius, Verbeyen and Cowper in his Appendix to Bidloo, which arising carneous and tendinous from the whole inward Superficies of the external Lamella of the Pterygoide Process; progressively descending broad and strong, have deep Impressions made in the Tendon, a little above the internal Angle or Point of the lower Jaw under the great Apophyses: For if the eight Muscles describ'd act together, the lower Jaw must be squeez'd or press'd with incredible force against the upper, and the eight cutting Teeth, being thus strongly compress'd makes the Action of

biting.

Hence the Meat or Food thus divided, is thrown among the Molares or Grinders; whose Superficies are broad, that they may perform the Action of Attrition: The straightning or holding of the Jaws strict together, proceeds first from the Contraction of the Buccinator or Trumpeters Muscle, which Cowper fays, arising broad and carneous in its beginning from the Fore Part of the Coronoide Process of the lower Jaw, flicks with strait Fibres in the Gums of each Jaw, which going forward thro' the Cheeks is inserted in the Angle of the Lips. The Orbicularis of the Lips, says the same Author, which performs the opening of the Mouth and Lips with its carneous Fibres is inferted into no Bone at all. The Zygomatick Muscle which hath a carneous rise from the external Part of the Os Jugalis descending obliquely is inserted about the corner of the Lips, the common Elevator of the Lips which is inserted from the fourth. Bone of the upper Jaw to the meeting of the Lips, in its own Tendon under that of the former, the proper Elevator of the upper Lip, which from the same fourth Bone hath immediately its rise upon the former obliquely descending, disappears under the Skin

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er the Skin Skin of the upper Lip: The proper Depressors of the under Lip arising from the lower Part of the Jaw next the Chin, are inserted into the under Lip: The proper Elevator of the under Lip, which springs from the lower part of the Gum of the under Jaw, is inserted into the lowermost Part of the Skin of the Chin: Lastly, by the Help of the common Depressor of the Lips, which arises carneous from the lower Edge of the lower Jaw, about its sides the ascending is inserted to the corner of the Mouth or Lips.

If all these act together, then the Cheeks and Lips are so clos'd to the Gums and Teeth, that neither Meat nor Drink can fall betwixt them; but if they move succeffively, they are directed to different places: In the next place the same Constriction is made by the Tongue, the Muscle chiefly voluble through all, and eafily moveable to every Part of the Mouth is acted: First, by the Muscles call'd Genioglossi, arising from the internal Part of the Chin by a carneous Beginning, issuing out by Dilatations, and inferted into the root of the Tongue, which draw the Tongue forward, and contract it back again, and as Cowper further shews, the Ceratoglossi arising from a broad carneous Beginning on the fide of the Os Hyoidis, from whence ascending by a large Duct of Fibres, we see them dispers'd thro' the Tongue, they move it back, depress and extend it: The Styloglossi which arising from an external Part of the Styloide Process of the Temporal Bone, by an acute Beginning obliquely descending, insert themselves by the hind Part of the Tongue, which they raife, draw fide ways and extend. Secondly, by the Mufcles forming the very Body of the Tongue which are according to Malpighius Longitudinal, they render the Tongue shorter, but transversly they draw it narrower, perpendicularly they lessen its Thickness: There are others that draw the Back and Sides of the Tongue, and some angular Muscles that contract it

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inward, others that depress the Back Part ridge ways. or to a point, and firait or right ones compressing the Basis thereof: All which singly or conjunct easily explain the determinate Motion of the Tongue in the Action, it performs in the Mouth towards Direction of the Meat and Drink either to the Grinders or the Gullet; adding thereto the Action of the Fibres on the external Muscles out of the Tongue, which move together with them. But it is plain that besides the Motion of the Jaw, backwards, forwards and fideways, that the Victuals are ground and broke to pieces, by the Muscles of the Cheeks and Lips and the Tongue, without having regard to the Teeth plac'd in the Mandables, to which Motion over and above there are other Changes made by the Mixture of the Saliva and the Mucus of the Palate and Jaws, together with the Intromission of Air.

The Origin, Nature and Mixture of the Saliva.

First according to the Notions of Steno, Nuck, and Valsalva, at the Root of the Farrisand betwixt the Mamillary Process, the Condyloide and the Os Jugale, adheres a complex conglomerate gland making a Sinus, whence spreading it self breadth ways, it reaches to the anterior, inferior and back Parts; this Secerns the Saliva by its Configuration or Make, from the Arterial Blood, and deposites it into a common Duct, which perforating the Buccinator, about the third upper Grinder of the Teeth pours it into the Mouth. Wharton faith, that there is a large internal Maxillary gland seated betwixt the Jaws, possessing almost the whole Length thereof. which separates the Saliva likewise from the same Arterial Source, throwing it into an excretory Duct that rifes on the back Part of it, and makes its way forward, almost to the fore-cutting Teeth, but in

the middle way admits of two fide Branches, from which spring two others that convey this Saliva to

the Forepart of the Tongue.

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There are glands says Bartholine, that appear under the Tongue, for that the Palate, Gums and Lips, are perforated by little Ducts or Sluces, thro' which an Humour or Flind much like the Saliva, but a great deal thinner flows. Schneider and Nuck both allow the glands of the Palate, especially the hind Part as well as those of the Uvulæ and Tonsillæ to separate a Mucus that mixes it self with the Aliment: But all these Fountains and Sluces are so seated, that they may emit their Liquors chiefly upon the Motion of Manducation or chewing. And Nuck makes it a Question, whether in Man there be any other Salivatory Gland or Duct?

The Saliva is a diluted Humour or Fluid, which is pellucid, will not congeal or thicken by the Fire, and is almost void of Tast and Smell; if shak'd it will hardly froth, it is a glandulous Liquor secreted from pure Arterial Blood; more copious sluid and sharp by Abstinence; but long fasting makes it very acrid, penetrating, deterging and resolving: Flowers, Meal, or succulent Vegetables encreases its Fermentation; it is thinner in Brutes, healthful Men and such as sleep much; too great a voluntary Secretion or Discharge of it, creates or procures an Anorexia, Dyspnea, and Atrophia or wasting: Water and Spirits makes it abound, but Salt and Oil decreases and

makes it less in Quantity.

The Motion of Mastication therefore by expressing the Saliva, and mixing it intimately with the Aliment, tends, first to promote the Nutrition of the Body. 2ly, To mix the oleous with the aqueous Parts. 3ly, For the Solution of the Saliva. 4ly, Fermentation. 5ly, An Alteration of Taste and Smell. 6ly, Exciting the intestine Motion in the mean time by the Assistance of Air, Aliment, Saliva,

and Mucus, well mix'd and incorporated together, by the weight of Fluidity, Elasticity, Heat of Body, and variety of Pressure at all times, there is Attenuation, Production of Fluxibility, and a Continuation of intestine Motion throughout the whole Mass.

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Thus being subdued and rendred tractable, attenuated, moisten'd, and lubricated the Food or Meat, is protruded towards the Gullet, whilst being bound there, by the Muscles of the Cheeks and Lips together with the Motion of the Tongue, it is compress'd betwixt this and what Bidloo calls the fornicated Palate, and the foldings between the Cheeks and the Oesophagus, while the Genioglossi, the Dorsi Longitudinales, the Styloglossi and Ceratoglossi by successive Motion act upon the hollow Root of the Tongue under Cowper's Vail of the Palate, the Uvula and Almond glands upon the Larynx, and Pharynx; and forming before the Membranes that cover them those Bodies of the Vertebræ of the Neck, which assist Deg-

lutition or fwallowing.

Then from the Action of the Genioglossi, the Geniobyoideus as Casserius mentions arising from the inward Part of the Chin, is fix'd about the Articulation of the smaller Cornua of the Cartilages of the Os Hyoidis; the Mylohyoideus which proceeds in a large Tendon from the middle Part of the Basis of the Os Hyoidis; is tyed or fix'd again by a large Aponeurofis to the lower Mandible, near the Grinders even to the Fore Parts possessing that Space which lies betwixt the Os Hyoidis, and the infides of the lower Jaw. The Styloceratobyoideus which iprings from an acute carneous Beginning of the Styliforme Process of the Temporal Bone, obliquely descending forward, penetrated by the Digastrick is interted into the Articulation of the larger Cornua with the Os Hyoidis; the Root of the Tongue is extended and lifted up, which being apply'd to the Vail of the Palate, the Foramen of opening

opening into the Nostrils is shut thereby; likewise the Os Hyoidis and the Larynx, affisted by the Contraction of the Thyrobyoideus of Aquapendent, which arising carneous from the side of the Os Hyoidis, in its descent it is tyed to the lower Part of the Scutiforme Cartilage, they are raised up, and by the Presfure made in swallowing they shut the Epiglottis, and apply or clap the Uvula to the Chink of the Glottis; expressing from the Palate, Tonsilla, Uvula, the Root of the Tongue, Epiglottis and Glands thereof, a slippery Mucus, they do not only come round in Deglutition, but they move forward, at the same time the Root of the Tongue, the Os Hyoidis and the Larynx; fo that they open the Pharynx as Valfalva relates, relaxing the Oesophagus according to Cowper, and so by that means perform the act of swallowing: But at the same time the internal and external Gargareon Muscles as Fallopius and Riolan call them, elevate the Vail of the Palate, extend it every way governing the Uvula, fo in swallowing they open the Glottis which being fallen, they occasion an Eructation, or casting up thro' the Notfrils.

From hence relaxing all that were contracted, both the Sternohyoidei move, which from the internal Part of the Clavicle near the Sternum, ascending with a broad carneous Beginning is inserted forward into the Basis of the Os Hyoidis; the Coracocerato hyoideis, which arising from a round carneous Beginning of the upper Part of the Scapula, to the Root of the Coracoide Process in its Progress making two Bellies, is affix'd to the Forepart of the Os Hyoidis. So the Pharynx being shut at the same time constringes the Oesophagus, arising on each side of the Scutiforme Cartilage, and running into each possible Line of the Gullet, by the force of swallowing they close in the hollow of the Oesophagus, under the Pharynx.

Which Tube saith Verbeyen, consisting of divers Membranes, depending mutually on each other,

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which by the Affistance of the first Mucus conconstantly moistens the internal Cavity, rendring the Saliva more oily, whereby it affords a flippery Passage indeglutition, and gives a necessary Flexibility to its Fibres. In the next place, where it depends on the former glandulous Coat, there a Juice is express'd by the canals into the hollow of the Tube, and here the Musculous Bodies are encompass'd by the orbicular Fibres, which are bound in by the Longitudinal; and at last all the fine thinner Parts are involved in a fibrous and vasculous Membrane. Therefore by the Contraction of the longitudinal and orbicular Fibres the lubricous Deglutition is made, by the fat way being dilated in fwallowing, whence the Aliment is protruded thro' the relax'd open Passage into the very Mouth of the Stomach; and therefore where it descends, the upper Flesh as Bartholine says of the lower Muscle of the Diaphragm, binding or constringing the Gullet there, as it passes by, shuts the Stomach or Ventrick in this Part.

The Action of the Stomach upon the Aliment.

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THE Meat and Drink being swallowed, shut up in the Stomach, entertain'd with Heat, and mix'd with the Air, according to the variety of matter, begins in this Place naturally to ferment or putrefie, either of which ways it is wonderfully chan-

ged, into a four, fweet, or rancid Mass.

The ragged Coat of the Stomach which receives the Aliment, is furnish'd partly with a hairy, tubulous, rough, moist, glutinous Cavity, and partly convex supply'd with many different small Glands, which arise from the vasculous Coat that adheres to it, abounding with Arteries, Veins and Nerves: Therefore from its small Sluices or Canals, it constantly emits

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emits a thin, subtle, pellucid, spumous Fluid, enrich'd with Spirits, moderately falt, and in the most voracious Animals, not Alcaline nor Acid, but in long fasting acrid, which is secreted out of the small Ducts of the Gastrick Arteries, besides a smooth Mucus Humour from the Glands, collected in little Bags, and express'd thence into the Cavity or hollow of the Ventricle: Large Contractions of the Stomach makes great Foldings, which stops the Aliment, caufing an acrid Ferment and affifting the Attrition or breaking of the Food to a Pulp, exciting thereby Hunger: Malpigious and Peyerius inform us, that such Animals as want this villous Coat and these Liquors, have a Crop or Craw, and Sinus or Receptacle before the Ventricle, which confifts of almost the like Texture and Humours.

If we consider in what Plenty the Saliva continually flows upon this Part to the Food, both from the Mouth and Gullet, perpetually diluting what is upon the Stomach, agitating the various Parts, effectually giving Motion to them by the Admission of Air, and exciting Heat in the Part; by which means we shall see the Effects perform'd of Maceration and Dilution, and the Aliment so attenuated and dissolv'd that Fermentation is procur'd, and thus adapted to enter into the Passages and Humours of our Body: Yet we cannot from hence discern how the Solids, that are not yet chew'd and broken to pieces, become successfully digested in the Stomach.

But that the Cause inquired after, may be found out, let us look into the Muscular Fabrick of the Stomach, and consider what Actions depend thereon: Then it will appear that the carneous Membrane of the Stomach, according to Willis is compos'd on the convex Part of strong Fibres, which beginning at the upper Orifice proceed to the Pylorus in an orbicular or spiral Order, and surround its Cavity in a perpendicular Situation almost the

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whole Length thereof, and bind it length ways by its Contraction, but on the concave or hollow Part, it confifts of Fibres, first of all oblique, which contract the bottom of the Stomach, obliquely towards its back Part, and towards the upper Orifice, and so length ways lessening the Contraction: In the next place, it hath strong Fibres, spreading over the Pylorus, by a Parallel Course length ways, united on the back Part, running round the upper Orifice, and so they open the Mouth of the Stomach when empty, and shut the upper Orifice when full, closely

constraining the lower.

It is likewise plain, that this Membrane is still girt as Willis observes, with another extreme one, which on the Convex Part is very vasculous, but on the Concave fibrous, with a Parallel Longitudinal Duct which helps the Confiriction or binding length ways; and therefore these Fibres are very springy, but are not altogether strong enough to discharge the Stomach, where they act together, they shut the Orifices, forcibly press or squeeze the distended Contents, mix and grind them with the vermicular Motion, attenuating the gross Mass contain'd in the Stomach, driving the more fluid Parts towards the Sinus, before the Pylorus, by which being contracted but less closed than the upper Orifice, the thinnest Part which is reduced to a pulpy matter, first is by degrees leifurely thrust into the Duodenum.

By such a Motion only says Harvey, but more violent many Animals use to macerate their Food: Our hearing saith Borellus is witness of this, so that Observation demonstrates it effectually; but the Nervous and Muscular Fabrick of this Viscera informs

us that there is the like in our felves.

Whether or no, or from what Cause can we understand, why little Meat and Drink received shall make the Stomach evacuate or discharge? Why the Stomach

The Action of the Stomach upon the Aliment. 23

Stomach too much loaded shou'd not do the same or digest, but vomit up crude that which hath lain there some time? What Reason can be given that tho' we greedily and at once pour down Liquors.

the Stomach shall certainly retain them.

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But these Things not yet appearing sufficient to explain the Alteration of the Aliment made in the Stomach; we ought further to have regard to, or bring under our Consideration. First the perpetual nourishing Heat of the ambient Parts. 2dly, The innumerable Motions or Strokes of the Arteries that are in the Stomach, Diaphragm, Caul, Spleen, Liver, Pancreas, Mesentey and Peritonæum. The forcible Vibrations of the Aorta it self. The Strength of the Nervous Liquor in no place more plentiful than here. 5thly, The continual Reciprocal and strong Compression of almost all the Peritonaum, by the great Diaphragm as Bartholin and Vesalius both call it, which ascends from the right inferior Part of the Three First Vertebræ of the Loins, on the left, from the last and last but one Vertebræ of the Thorax, arising from a tendinous and then a carneous Beginning with fireight Fibres on the upper Part, springing from a thin membranous Beginning, it presently grows carneous from all that side of the cartilaginous Top of the inferior Ribs and the lowest Part of the Sternum, running downwards with a Hundred creeping Fibres; it becomes tendinous, and is intermix'd or confounded with the former: From whence acting as from a Convex, it is plane, and binds the Abdomen and its Contents; strongly compressing Ten Abdominal Muscles with one united Contraction, and governing the Abdomen by its reciprocal Motions and great Strength, as Contemplation informs us.

For first saith Vesalius, the oblique, exterior, tendinous and carneous Part, arises from the lower side of the Ribs, descending it grows tendinous, and is

inserted

24 The Action of the Stomach upon the Aliment.

inserted into the linea alba, the Os Pubis, the anterior and upper Side of the Os Ilium. 2dly, According to Spigelius, the oblique inferior carneous Part ariles from the circular Course of the Os Pubis, growing tendinous, from the fore bending Fibres, and is inferted into the linea alba and the Cartilages of the Ribs. Fallopius saith it is pyramidal and carneous from the anterior upper Part of the Os Pubis, grows tendinous to the linea alba, and is inserted into the Navel; with Vefalius, it is transverse from a carneous Rise, of the transverse Processes of the Vertebræ of the Loins, and derives it felf from the Spine of the Os Ilium, the Ligament of the Os Pubis, and the cartilaginous End of the Ribs, beneath the Sternum, being inferted with a broad Tendon to all the linea alba under the right Abdominal. Laftly, Spigelius affirms the right carneous one comes from the Xiphoide Cartilage, the Cartilages of both lower true Ribs, the Cartilages of both the upper Bastard Ribs, confilling of five tendinous and five carneous Parts, and at last is inserted into the upper anterior Part of the Os Pubis.

But if we think the Force of all these Causes, conspiring together in one united Work sufficient to render the Mass in one place soft and soluble enough, we may truly fee the Effects which happen to this Part, the confequences of which ought to be. First, That Moveables be mix'd with Fluids, to levigate and resolve into Fluidity to produce a cineritious or ash Colour, to press by degrees, and Iqueez out what is contain'd therein. 2ly, That the more tenacious remains be kept or with-held from the first Operations, and that the same Causes continuing, they undergo the same Work, and shew the same Phanomena at first. 3ly, That Fibres, Membranes; Cartifages, the Bones, and the hardest Parts of vegetable things be render'd juicy or liquid, and lastly, that they be expell'd the Stomach,

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yet cohering in Form. 4ly, That by dissolving Vegetable and Animal Food, a Humor be made Analogous to that of our own. 5ly, That there be made a speedy Restoration to the Feeble from want of Strength; whilst the subtle Fluid received by the Pipes or Canals, from the Mouth, Gullet and Stomach, opening and evacuating themselves into the Lymphaticks, is from hence sent by a short Road into the sanguineous Veins, and thence immediately by the assistance of the Arteries, distributed into all Parts of the Body.

Therefore whether the Heat alone be the Sto-mach's Cook? or it be the vital Acor or Sharpness that is in the Stomach, inspiring Life, as natural to that Ventricle? Whether Digestion be desicient without Acid? What thick, salt, acid or bitter Humor, causes such Ructations in the Breast of a healthful Man, and whence this arises? Whether it be a different or various Cause that excites Hunger, and what it is? Why the Stomach swells in Digestion; but is flaccid or lank when empty?

The Action of the Intestines or Guts upon the Aliment.

That it may be rightly understood what happens to the Chyle of the Stomach, and the remaining Faces in the Guts, we will consider the Fabrick or Structure of this Duct, the Humors drawn from thence, the absolving Vessels, their Motion, and that of the circumjacent Parts. First, The Coat or Covering of the small Guts, which contains the Chyle, is rough, broad and perforated with aqueous and glutinous Pipes, with the Mouths of the Lacteals and large Apertures, which being distinct, afford a wat'ry, glutinous Humor, that constantly moistens

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and lubricates a musculous one lying upon it, which is very rough, here especially, where it is tyed to the Mesentery; and convex with a vasculous, glandulous and nervous Part; from whence it is a Check to the Chyle and Fæces, a continual Interception of these, the Lubrication and Defence of the Cavity, daily Dilution of the grosser Fæces, especially about the end of the Ileum, where there is an Oiliness of the solider Excrement.

Here is another thin Coat, according to Willis, except we will suppose it to be part of the same, consisting of a reticular Texture of an innumerable quantity of arterial, veinous and nervous Vessels, which adhere almost to the Basis of the Peyerian Glands, the tops of which opening to the Supersicies, supply it with a Gelly or Mucus, these in the beginning of the small Guts are few, but increase in Size and Number; from whence proceeds Heat, Pulsation, Trituration, Dilution, Lubrication and a Defence.

A muscular Coat surrounds this, with a concave Part, strengthen'd with thick, firm, annular Fibres, inserted into the Sides or Borders of the Mesentery as a Tendon; from whence the whole Cavity of the small Guts is bound successively by Parts with rising Valves that play backwards and forwards reciprocally; the Contents are lodg'd in the rough Sides of the Intestine, where they are ground, mix'd, attenuated, and hindred from Concretion, the very sides of the Guts, being rub'd off from the Convex Part length-ways the first striking against them, with which folding in, they are contracted, and are stretch'd out-right, especially in Places from the Region of Mesentery to which they are tyed.

The last external Coat of all that wraps in the former, is from the Peritonzum, and knit to the Mesentery. This whole long Duct, Pipe or Canal, is tyed short to the Borders or Sides of the Mesentery;

Of the Action of the Cyftick and Hepatick Bile. 27 it hangs downwards, and is gathered or folded wonderfully into a great many Turns or Windings, almost every way, being cloth'd and interspers'd with Fat, beside the Lubrication it receives from the gentle Exhalations or Dew of the Caul; it is relaxed and render'd moveable; is extended or ftretch'd under the Peritonaum, with which, by the Motion of other ambient Causes, they perform reciprocal Actions together: In a healthful Condition,it only wants dilnting, the Faces growing thick, or the nearer their Exclusion, in a found and lively State this Vessel is wonderfully contracted; it is perpetually agitated by the Peristaltick Motion, wherefore it becomes more apt for grinding, bruifing, feparating, disfolving, attenuating and volatilizing, from whence it propels the Chyle into the Mouths of the Lacteals, and these are common to the whole Tract or Circuit of this Vessel.

In the Duodenum its Rectitude and Narrowness is proper to it, but it is laxer at its knitting to the Meseraick, the Perforation at the end for the common Passage of the Bile and the Pancreatick Duct of Wirsungius otherwise joyned together, according to Glisson and Graef, are sometimes separated or divided; wherefore the celebrated Passage to the Chyle is made by these Mouths, by this way you may discover a triple Humour entring the Cavity of the Gut, to wit, the Cystick and Hepatick Bile as well as

the Lympha from the Pancreas.

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Of the Action of the Cyftick and Hepatick Bile.

THE Bile of the Bladder is thicker, of a deeper yellow, bitterer, and which does not conftantly flow into the Intestines, but is secern'd copiously by external Compression, and the Contraction of the irritated Fibres. But the Hepatick Bile is thinner, more

more pellucid, fofter, and flows drop by drop, being only expell'd by the Actions of the Ducts and Humors about it. Thirdly, The Pancreatick Juice is almost perpetually secerning; from which when it meets with the Saliva and Mucus of the Mouth, Gullet, Stomach and Guts, it makes a spumous or frothy Liquor, and sometimes a little clammy, which is often squeez'd up into the Stomach when

empty.

But the Cyftick Bile refifts, sharps and sours, and is furnish'd with another Faculty peculiar to it self; it is faponaceous, absterges and makes Oils mix with Water; it dissolves Rosins and the most tenacious Gums, and makes them homogeneous, is neither Alcalick nor Acid, but coagulates Oil, Salt and Spirits diluted with Water; will not burn, except it be first dry'd, and is the most biting or sharpest of all the Humors of the Body; wherefore its Effects are when mix'd with the Chyle and Faces to attenuate, absterge and stimulate the moving Fibres, to intermix those Fluids which are of different kinds, to break the acrid faline Parts, and divide the coagulated or thick ones, to expedite the way for the Chyle, excite or provoke the Appetite to serve instead of a ferment, and to affimulate the crude to the Parts digested, in these the Cystick Bile much exceeds the Hepatick, the Description of which I shall refer to the Liver.

Of the Action of the Pancreatick Lympha.

Nder the hind Part, and the bottom of the Stomach, in the first Place there hangs in the po-sterior Lamella of the Caul, a large conglomerate Gland, call'd by Wharton, Graef and Vefalius, the Pancereas, which by the Affistance of the Cæliack Arteries and the Texture of the Gland secerns a Humor

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Of the Action of the Paucreatick Lympha.

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or Fluid into one common Duct, which makes its Exit into the Duodenum, and from thence brings all that Lympha; but it is almost insipid, in Taste somewhat salt, limpid, plentiful, always making and emitting, neither acid nor alcaline, but analogous to the Saliva, confusedly mix'd with the Bile in living Bodies, being digested therewith, and adhering in the same Pipe or Tube with it, is not observ'd to give any Affistance to the Motion of the Gut, but is equally distributed thro' it, and sometimes slows alone into the Empty Intestines, hence the Use of it is to mix with the Chyle, Faces, Gall and Mucus, in order to dilute their groffer Parts and render them more fluid and thin, that they may better mix together, to render the Chyle more miscible in the Blood, and to adapt it for a readier Passage thro' the Lacteals, to soften its Austereness, Viscidity and Bitterness, to change its Colour, and intermix it perfectly with the Chyle, to make it capable of performing the Office of a Menstruum and Vehicle, so to change the fingular Tafte and Smell of Food, that it becomes as it were almost indolent, and that the Chyle may be able to go and return this way with Ease and Expedition.

Wherefore being strongly question'd wilt thou answer, whether the Bile be double? Whether an Excrement of the Hepatick Chyle, while the Blood is there return'd back? or whether it produces any Advantage to Health and Life? but what is that? in short whether the Paucreas and Bile answer the System of Helmont and Sylvius? or whether they become a Duumvirate here and what? whether they can excite and sustain Life from the Intestine Motion of the Blood? what the Pancreatick Juice is, and to what end? why does it slow with the Bile, or at least next it? whether the Animal can live

well without it?

The Propulsion of the Chyle into the Lasteals.

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By the Contraction of the strait Fibres of the Intestines, which are inserted to their external Coat as a Tendon, the Vessel or Pipe is made rough in the Part which is turn'd back from the Mesentery, hence from the spiral Tube it acquires a Cylindrick Figure, by which means in the Part joyn'd to the Mesentery it is lax, in the Part against the Mesentery it is constring'd; wherefore the Passages or Pores next the Mesentery, that is, the Mouths of the Lacteals, are found lax and open to the Fluid, moveable and lubricated Chyle, by which it may readily enter; in the mean time the Valves being strengthen'd by the same Force erect, mutually approach each other, intercept the Chyle, stop it, and almost close the contracted Part of the Intestine.

Also by the orbicular contracted Fibres, inserted into the Mesentery as a Tendon, the Cylindrick Spaces are contracted, and thut up by the Valves mutually preffing to each other, wherefore the Chyle by means of this Force, and the Action of the ambient Bodies, is squeez'd out, diluted, mix'd and driven towards the proper Places in the Mesentery, that is, it is forced into the Mouths of the Lacteals, which are best open'd by the Peristaltick Motion: Yet the fermenting Chyle enters not the Lacteals by its own Energy. That Chyle therefore that enters the Mouths of the Lacteals, is falfly suppos'd to be only the Produation of Meat and Drink, for it is a Fluid or Humour confifting chiefly of Saliva, the thin Mucus of the Mouth, that double Liquor of the Gullet and Stomach, of the Cystick and Hepatick Bile the Pancreatick Lympha, of Peyerius intestinal Humor, and as Brunnerus of the Paucreas fays, of that strong, copious and subtle Liquor, supply'd from an innumerable quantity of Nerves; for all these Humors, The Propulsion of the Chyle into the Lacteals. 31 whether passing thro', flowing out, or mix'd with the Chyle, are always entring the Lacteals, tho' they are only conspicuous or visible a little after eating.

Whether or no the thin, bilious and lymphatick Part of that Chyle is not more received into the abforbing Vessels, that open upon the inward Superficies of the Guts, and empty or discharge themselves into the Meseraick Veins, from whence there is a Dilution made in the Vena Porta, and new Matter for the Bile to secern? Certainly the Number of these, their Largeness, and singular Texture or Make about the Intestines, their common Nature with all Veins, the Humor flowing hence, as well into the Vena Porta as the Artery: The Disposition of this Fluid; the great quantity of Humors meeting in the Intestines, which are not all received by the Lacteals, neither are they observ'd to be expell'd by Siege. Comparative Anatomy not finding Lacteals in Oviparous Animals, and yet discovering a Passage in the Meseraicks from the Cavity of the Intestines, this Enquiry is answer'd.

Since all the Phanomena feem to depend on Meat and Drink, from the first Reception of them, to their Entrance into the Lacteals, their Consequences feem clearly, naturally, and distinctly demonstrable from the Structure, Fabrick and Strength of the Vessels, the natural Knowledge of the Humors, and their virtual Operation demonstrable to Sense or reasonable Mechanicks; whether these ought to be call'd Postulata, that are obscure, doubtful and dissonant to Reason and Experiments? Heat is call'd the Cook of the Stomach, its native Life, and what renders the Sourness thereof volatile. Archaus, the Smith, the Alcaline Bile, fermenting changes the fix'd acid Chyle into a volatile falt one, the Sharpness of the Pancreatick Lympha, and the Eftervescence with the Alcaline Bile, the Precipitation that depurates or fines down the Chyle: Peripate-

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tick, Galenick, and Chymick Faculties; with a thousand other pernicious Hypotheses and false Notions that give Laws and Rules to Physick.

The Matter and Expulsion of the Intestinal Fæces.

THE grosser part of the Aliment received, slicking obstinately in the Mouths or Orifices of the Lacteals, is loosed as it were by the Force of Manducation, the liquid Part being absorb'd, by the continual Gyration or Motion of the small Guts and the Structure of the Valves therein, driving the Solid by degrees into narrower and straiter Places, the lubricated Fat of the Glands giving way, it becomes press'd, squeez'd, macerated, and drawn dry from any more Juice, 'til at last it is successively thrust forward into the wide Gut, call'd Cæcum.

The Diverticulum or Turning aside of the Cacum as Vesalius will have it, the vermicular Intestine, the Valve of Tulpius, from hence make a perpendicular Ascent in the first Colon, that it cannot return into the Ileum, but stagnating here, the Faces being ftrongly press'd from their own Weight, the Action of the Grt and the external Parts about it; they are deprived of all Moisture which is absorb'd into the Lymphaticks: Hence they discharge or empty their Humors into the alveum latteum, then the Faces grow hard and dry, and putrifying at last, gain a fætid Stench, and become Excrement or Dung: Then the Values which are here so common, fays Bartbolin, and made of muscular contracting Ligaments, by their bending or winding in, shew where the Stoppage is made, that the Fæces are retain'd fo long; from hence the strong, membranous muscular Fibres, by the Strength of their Contraction, make

make the Faces hard and immoveable, so that they would not be easily driven thro' the long Canal of the Guts, but as they are lubricated by the Fat of the Glands, as Peyerius afferts, and thereby sent into

the Intestinum Rectum.

The almost perpendicular Descent of which, favs Vefalius, the internal Superficies whereof being smooth or labricated without Valves or any Muscular Ligament, makes that being driven thus far, the Faces readily descend by their weight or acrimony, or both, irritating the ftrong Muscular Fibres, compressing the Gut, till the Faces slick at the Sphinter. Then relaxing the large, gross, carneous, orbicular Sphineter as Bidloo calls it, that furrounds the end of the Intestinum rectum, the Levators of the Anus are contracted, which from the internal Part of the Bones of the Pubis, Ischium and Sacrum, which striking the End of the Redum with their winding Fibres, they dilate and raise it up. Hence by inspiring, Retenfion, Rarefaction, Compression of the Breaft, the Affiftance of Air, and then of the Diaphragm and abdominal Muscles, the Fæces are expelled, while the Sphineter is only contracted.

From whence it appears what the matter of the Fæces is: Whether it consists of the Recrement of the Bile, Blood, Mucus, Saliva or Lympha: What its particular Cause is: Whether from an excrementitious Ferment: Why the Intestines from thence have more Glands and more Mucus proper to their purpose: What Use Fat is of to the Guts, chiefly at the end: Why strong People are costive, have hard Stools and sew of them: Why the Hemorrhoides are so common to such: Why in Exoneration, Urine is discharg'd together with Siege: Why the Tenesmus attend such as labour under the Stone in the Bladder? Why the Strangury, in the Bloody Flux, and

why the Tenesmus in the Strangury.

The Action of the Mesentery upon the Chyle.

Motion the Mouths of the Lacteals being open, is propell'd the same way, and by the same affistance; but when the Lacteals are open'd into the Cavity of the Intestines by an oblique way, as many affirm, and the Mouths are small, the sluider Part only, separated from the grosser and more ramous, will enter. Whence we may conceive, why Men are not hurt with that variety of acrid, hard and sharp things which they eat, but remain healthful notwithstanding; let us compare the Structure of the Oesophagus, the Stomach and Guts, and we shall see they differ widely from the Structure of the Viscera.

The Causes which derive the Chyle into the Lacteals remaining, they are impell'd again a-fresh, and so promote the former, that it may slow by the Vessels situated betwixt the Duplicature of the Meseraicks, it is coerced by the semilunar Valves of Nuck, and the Flux carried towards the Loins. The Lasteals arise from the smallest Beginnings in the human Mesentery, most of the lesser concurring at acute Angles, create a larger Stream, then again recede mutually from each other, and after that making an Island unite in one Canal, which is divided as the rest, that hence they may form larger Trunks, which are every where supply'd with many Valves, hence the Mixture, Fluidity and Attenuation is increas'd: So far they are call'd Lasteals of the sirst

kind.

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The Action of the Meseraick Glands.

Ence in a right, oblique, cross or divided way. they tend to Nucks Glandulæ vagæ, interspers'd thro' the Mesentery, running from whence, they enter, clothe, and furround or bind them in, but going out again, they are less branch'd, being turgid with the more fluid and aqueous Chyle, and diffinguish'd by many Valves, and then they run to the Ciftern seated on the Loins, and these obtain the Name of Lacteals of the second kind. From this it is evident, that the Chyle cannot be any ways fecern'd, at these Glands, but seems to be there temper'd or allayed; which is the more apparent, if we Suppose with Nuck, that these cavernous Glands are water'd from many Arteries and Nerves, and that they admit the Lympha of the several Viscera in the Abdomen, which entring there, dilute the Humors the more: Therefore being stopt upon that part, there is made a Conquaffation, Dilution, and perhaps a Mixture of the Spirits from the Nerves; from whence the Lacteal Veffels being more united, tend to Nucks Ciftern of the Chyle, often to that, call'd by Cowper Trilocular, and hereby the most copious Lympha, saith Nuck, evacuates it self of almost all the Parts, seated under the Diaphragm, from whence being brought by the Lymphaticks, it is thrown into this common Channel: For the Valves, Ligatures and Lymphatick Diseases instruct us, that there is such a Course or Circuit of this Fluid, which abounding with water Spirits and subtle Salt, is the most pure Part of the Blood, as its Office, excretory Ducts, and sensible Functions demonstrate.

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The Action of the Chyliferous Duct upon the Chyle.

HE Chyle being thus diluted by the Cisterns plac'd under the Diaphragm, from the Causes already describ'd, chiefly by the Force of the Septum Medium, and the Pulse of the descending Trunk of the Aorta, it is thrown into Pequet's Thoracick Duct, furnish'd on all sides with Valves, from hence into the left Subelavian just thereabouts, where the Jugular opens into it, bound or directed by the help and affiltance of the femilinar Valve of Lower, scarcely admitting the Chyle into the Vein, but none at all into the Thoracick Duct; the whole Lympha flows together almost from every part of the Thorax, whence it comes that that great plenty of Chyle and Lympha ascends so easily in Man who is erect, by so small or flender a Pipe, that is convey'd with Winding or Turnings, which will more plainly appear if we consider. First, The contractile Spring or Strength of the Intestines, and the affisting Force that drives the Chyle from them. 2ly, The Apriness of the Lacteal Valves the Ciffern and Pequet's Dutt, that expedites the Motion with wonderful Efficacy. The Pulse of the Meseraick Arteries which strike the Lacteals in Parallels. 4ly, the great Strength of the Diaphragm upon the Channel. 5ly, the Pressure of the Peritonaum, which from powerful Caules acts upon the thin Meseraick Membrane. 6ly, The proper contractile Form of the Sides of the Veffels, that compose Pequet's Duct, which is very strong 7ly, The strong Pulsations of even after Death. the Aurta it felf, so near to the Thoracick Duct.

We must therefore observe those things which happen to the Chyle in the middle way betwixt the Intestines and the Veins; which we shall divide into Four. First, The slow Motion by the Intestines, La-

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Eteals and Glands, which the Laxness and Length of the first, the Number and Smallness of the latter the evince: The End of all these is refining or purifying the Fluids. 2ly, The external Motion impresed upon the Fluid from the Vessels, the Effect of which erns is Propulsion, Mixtion, Attenuation and Conservaules tion of the Fluid. Hence we are taught to contemplate the Position of the Lacteal Vessels, encreasing by degrees, and supply'd every where with Valves, mutually agreeing with each other, that is going backwards and forwards, and at last uniting: In the next place, the strong Action of the Septum, on the Abdominal Muscles, and the Compression rceof the Viscera into the Lacteal Tubes, cleaving alat all most to the Superficies of the Mesentery, and lying as it were naked or expos'd; supplying a proper Heat in degree and moisture; the effects of which are known and observ'd by the Chymists: Lastly, The Pulsation of the Mesenterick Arteries, and the Aorta, being strongly united on all sides to the Canals, so we that by their own motion they agitate them. ngth

Thirdly, To make an Allay or Temperament, by the Mixture of almost all the Lympha of the Body, the Reception of a Chyliferous humid Vapour, that is in the first place suck'd in to these Lymphatick Vessels; and perhaps by the Admission of Spirits every-where to the conglobate Glands of the Lympha thro' the Nerves, and with that thrown into the

Chyle.

Fourthly, To its Analogy with all the Parts of the Body, before it enters into the Blood Veilels; whilst it passes from the Mouth to the Subclavian, there is perpetually, gently, successively, and by degrees added something of almost every Humor of the Body that is elaborated, digested, frequently carried round and transacted throughout all the Vessels, as the Saliva, Mucus, Lympha and the Mucus of Guller, Stomach and Intestines, the Pancreatick Sa-

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which t the e into s, La-Eteals liva, the Cyftick and Hepatick Bile, and perhaps that of the Spirits from some of the minutest Parts of the Body; then at last this is accurately mix'd by the Strength of the whole Fabrick, the Figure,

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Situation and Motion of the Vessels.

Whofoever weighs thefe things will find the Principles of which the Blood is composed, to be lodg'd in the Chyle, while he may perceive Water, Spirit, Oil and Salts mix'd together; neither let any one wonder at the reason why Diseases are so rare in the Mesentery, tho' that be seated so near to the Crude or undigefted Fluid? For he may observe on all sides Provision solicitously bestow'd: The Lacteals and the Thoracick Duct are equally affifted for conveying the Lympha by the Spirits, as well as they serve for the Motion of the Chyle; but he that would know the Circuit and Change or Alteration of the Chyle cast into the Veins, and how it is mix'd with the Blood, must necessarily enquire into, and find out the progressive Motion and Essicacy of that Fluid, which we shall pursue in this following Method.

Of the Fabrick or Structure of the Veins and Arteries.

THE red Humor found almost every where throughout a living Body, and call'd Blood, is lodg'd in a sound Man in proper Vessels, which are either Veins, Arteries or other intermediate Receptacles. Arteries appear to be Canals, of a Conoide or Pine-apple-like, oblique, crooked, or branching Figure; internally they are smooth and without Valves, except in the Heart, their Branches have various Originals, but often they proceed from acute Angles towards the top, but rarely from right ones,

ones, as in the Intercostals, &c. seldomer from obtuse Angles as in the umbilical Arteries of the Fætus. They are made up of five Tunicks or Coats, the uppermost of which according to Willis is thin and nervous in the outward Superficies; in the inward very dense, being interwov'n with a Network Texture of Arterial Vessels from the Coronary Arteries and others, together with veins; the Second Coat, faith Ruysch is cellulous, thin, but very dilatable, from the blowing up of the Cells; the third is glandulous, the fourth Muscular, being made with annular thin Fibres, strongly knit together, with a great Number of Strata, that are divisible into many Lamella and very Elastick. Lastly, The fifth Coat, which is the innermost, is thin and membranous, the Fibres being ftretch'd length-ways, this intire Vessel continues to beat and leap while Life remains.

The Veins are in Figure and Distribution almost like the Arteries; but they are wider, and abundantly more in number, they are much thinner and unactive in all their Membranes; they have Valves, which are almost single at the Places of inserting their Branches into the great Trunk, and double chiefly says Aquapendent, as they join into the right Trunks of the larger Veins, that are remoter from the Heart, and which carry the Blood perpendicularly upwards; which being made so, saith Cowper, and apply'd to the Cavities of the Canals, that they admit the Blood from the lesser Branch to the greater, prevent its return, and sustain the weight; but these very Vessels in the greatest Actions of Life neither

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All the Arteries contain'd in the whole Body, are united to the Trunk of the Aorta in its Passage, while that Trunk takes its Rise from the lest Ventricle of the Heart, but those which serve for the use of the Lungs, are in like manner stretch'd out from the Pulmonary Artery to the Right Ventricle of the Heart,

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as the Form thereof shews when they are distended

by an Injection of Wax.

The Veinshow numerous soever, by the same Parity of Reason terminate in the Vena Cava, where that Vessel grows larger, and becomes cover'd with an Arterial Membrane forming a large Sinus, after which it presently ends in the Right Auricle of the Heart: But the said Vein, by the form or make of the Lungs, from the sour greater Branches distributed therein, makes such a Sinus as the former, which is stretch'd forth into the lest Ear; but there is some Diversity in the Liver, that is to be explain'd when we come to speak of that Part. Both these Vessels are largest in the Heart, from whence they decrease by degrees, and attending one another almost every where, they are extended together thro' all Parts of the Body.

Of the Circulation of the Blood.

Life, is almost totally driven out of any of the Arteries, open'd or divided by a large Wound, and that in a short time, and with great force, as the Butchers teach us; neither is it material, in what Artery the Wound is made, if we give credit to the Dissection of Dogs. Wherefore in a live Animal thus wounded, all the Blood is mov'd swiftly and with violence, especially if the other Arteries that are not wounded be tyed, while the Blood leaps out of the wounded Part.

From whence it is plain, there is a Passage for the Blood from every Part of the Body that abounds therewith, into every Artery; and then the whole Mass of Blood is mov'd, through that one Vessel or Canal, and consequently it ought first of all to be

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Again, whatsoever Part of the Arteries you shall. fee bound about with a Fillet, that will tumifie and vibrate betwixt the Bandage and the Heart; likewise the neighbouring or adjacent Arteries that are free, beat vehemently; and if it be cut betwixt the Heart and the Bandage, it throws out the Blood quickly by Spouts or Streams, even till sudden Death succeed: But where it is cut betwixt the Bandage and the extream Parts, a little Blood only falls out by Drops: Yet we ought to take care, that it be a fingle Artery, not joyn'd intermediately by some large Anastomoses of a neighbouring Artery in the Place above the Ligature.

Therefore the Vital Blood flows by the Arteries. but it is from the Flux passing out of the Heart to the extream Parts, from a broader Vessel into a straiter or narrower Part, from the Trunk into the Branches; therefore by this Rule or Law of Motion, all the Blood may be convey'd into every Artery or any fingle one, and from that spread abroad or thrown out, and not the contrary way. Also take a large Vein and bind it with a Fillet, and it will fwell betwixt the Extremities and the Bandage, but not pulse or beat: It is empty betwixt the Heart and the Fillet, and by wounding it below, the Blood will flow out, till Death or a fainting of the Spirits ensues; but if you strike above the Ligature, scarce any Blood will issue thence, nor matters it which

Vein it is, as Blood letting shows.

Wherefore the vital Humour flows indeed swiftly from every Part of the Body into this Vein; but obferve, after that manner, that the Road or Course is evident by this, from the extreme or remote Parts of the Body to the Heart, from the narrowness of the Vein towards its Enlargement, from the Branches into the Trunk, and not otherwise as the Valves inftruct us. Hence it plainly appears, that all the Arteries of the Body conftantly carry the Vital Blood swiftly round from the left Auricle of the Heart, thro' the Trunks of the Arteries into the Branches; from these, to all the Parts of the Body, internal and external.

But on the contrary, all the Veins of the Body, except those call'd the Portæ in the Liver, from their smaller or minuter Branches, constantly carry back the Blood into the Branches of the Veins, from these into the Trunks, from thence into the Venal Sinus, and at last into the right Auricle; for from the Venal Sinus the collected Blood may be driven by the round wov'n Muscle, into the reslected right Auricle, if nothing oppose, but it receives Assistance from the Motion of the venous Blood press'd thus far.

But fince the right Auricle as well as the left, according to Lower, is a large hollow Muscle, compos'd of a double Series of firm strong Fibres, running with a contrary Course into the opposite Tendons of the Sides, and endowed as Ruysch saith, with innumerable Veins and Arteries, supported on one Part, from the venous Tendon of the right Side of the Heart, growing on the other Part harder, being almost form'd round, or into a Circle by the Vena Cava: It is plain the Blood by this contractile Strength express'd with great force, may be thrown inwards to the right relaxed Ventricle of the Heart.

For then the Heart emptying from a longer Return drawing back towards the Sides and towards the Point, with three Tricuspid Values as Vieussens calls them, by the oblong fine carneous Papillae or Teats, arising from the Sides of the Right Ventricle of the Heart at that time drawn back, yet gives sufficient way, that the Course of the Blood may not be altogether obstructed. The Fabrick of the Part,

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the Phanomena on live Diffections, Wind, Injections,

&c. confirm the fame.

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But if the Right Cavity thus fill'd with Blood, by the Contraction of its Fibres presses the Blood towards the Mouth, here rising near the Sides; it elevates the Tricuspid Valves so tyed to the sleshy Columns, stretch'd out from the opposite Side, that being entirely fallen or slagg'd, they can never be apply'd to the Sides of the Right Ventricle of the Heart, but thrusts these towards the Right Auricle so long, till being joyn'd there, they nicely shut the Mouth persectly hindring any Return; because those very Columns are scarcely permitted to be

pull'd farther backwards.

By the same Afsistance, the same Blood is forced from the inferior Parts upwards, into Vieusens three Semilunar Valves, seated in the Course of the other Passage lying open into the Pulmonary Artery, it presess these on the Sides of the Artery opening away, into that alone. But the Figure, Substance, and Connexion of the same Valves, demonstrate that these are thus forced from the Pressure of the Blood behind, out of the Pulmonary Artery to the Right Ventricle, that being joyn'd together they nicely intercept the Course, and more exactly sustain the Blood, by how much greater Strength it is push'd on: The Texture of the Part, the Phænomena in opening of live Bodies, Arteriotomy and Injection consistm it.

Therefore the venous Blood, that is, all the Blood of the Body is moved out of the Venal Sinus through the Auricle, and through the Right Ventricle, conftantly, quickly, and violently into the Pulmonary Artery only. Out of the left Venal Sinus of Ruysch from the four great Vessels running together, all the Pulmonick Blood may be taken and pass'd through, by the Musculous Strength of its Texture into the left laxated Auricle, much less than the Right yet made

made and seated like the former: So from hence it may be easily propell'd into the lest Ventricle for the same reason, because of the like Condition of two Mitral Valves, as Vesalius Lower and Vieusens call them: but cannot return the same way.

And by reason of the three Semilunar Valves seated in the Entrance into the Aorta, this Course is directed right into the Aorta from the same Causes, especially if that rests, and exactly shuts up the way to the Blood forcing back again: But we speak this of an adult Man, and the usual Course of conveying the Spirits to Mortals.

Therefore all the Pulmonick Blood is mov'd from the Lungs into the left venal Sinus, the left Auricle and Ventricle, from hence it is constantly, suddenly, and violently thrown into the Aorta; which Motion evidently appears to be done in living Creatures with

these Phanomena.

First, That both the Venal Sinus's being fill'd together, swell. 2dly, That both the Auricles flag together. 2dly, They are then fill'd in the very moment with Blood acted or driven on, by the contra-Cile force of the Musculous Sinus next that of the Venous. 4ly, In that very nick of time, both Ventricles contract themselves, they evacuate the Blood, the two great Arteries are fill'd and diluted. sly, The Moment after this Constriction each Ventricle flags and is empty, then is elongated, and augmented in 6ly, During which each Auricle contracts it felf by the Muscular Motion, expresses the Blood contain'd therein, and propells it into the Cavities of the Heart. 7ly, In the mean time the Venal Sinusses are fill'd again as in the first Phanomenon, and all return with the same Series of Order, and so remain till the Animal languishes, and is at the point of Death. 8ly, When the Auricles beat often as well as the Venal Sinus's, then the Ventricles are contracted after the same manner. There-

out

Therefore the whole Mass of Blood returning from every internal as well external Part of the Body, and from the Heart it self, and its Auricles is driven into the right Cavity, from thence it is work'd by the Lungs into the left, and hence thro' the whole Habit or Circuit of the Body, and then back again to the Heart; this is the Reason of the Blood's running round, or its Circulation, the glory of which Invention makes the Name of Harvey Immortal; and this is confirm'd by Infusion, Transfusion, and Microscopical Observation.

In like manner the Chyle, tho' in small Quantity being confrantly pres'd thro' the Thoracick Duct, raises the Value of the Subclavian Vein, always shut by the determinate Motion of the Blood fo far, that that Portion of the Chyle which in its Ascent might leffen the Refistance of the Bloods Pressure, enters into that Vein, and thence paffes into the Vena Cava, the Venous Sinus, the right Auricle, and last of all into all one neds ons

the first Ventricle of the Heart.

This continual but small Admission, this concourse or meeting of the Blood from opposite Strokes as Verheyen fays, by a contrary fwift Motion, perform d in this one Place, the Lympha returning with larger Recruits, makes it that the Mixture of Blood and Chyle is begun here, that all Concretion may be hindred or prevented. I said blod anamadi sail

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Which being done, the Pulse according to the Texture of the Auricle, and immediately from the ftrong Contraction thereof, together with the oppofite Concussions or Strokes of all the Columns on every fide, is manag'd and divided, the Fluid preferved, it affects the Auricle with greater force, perhaps on the other side, as Verbeyen takes notice, by the Bloods glancing thro', all which are affifted and encreas'd by the Blood flowing into Vieusfens new invented hollow of the Auricle, returning from the Substance of the Heart and the Auricle, which without doubt is the most agile or moveable, and is projected or thrown out with vast force in the Auricles.

But what is done to the Blood and Chyle thus poured into the Heart, is best known from the Property of the Blood and the Texture of the Heart; the way of discovering of which is to be taken from the variety of the Parts examined by folid Experiments. fuch as we shall here recite.

The Blood that is in the Right Ventricle of a live empty Animal, doth neither tafte Alcali nor Acid.

but Salt like Sal Armoniac or Sea Salt.

If it is mixed with Acids or Alcalies, it shews no evident Motions of Effervescence, but changes Co-

lours and Degrees of Fluidity.

Leaping out of the Pulmonary Artery cut, and received in a Vessel, it gives us no Sign of an intefline Ebullition or Effervescence, but yields a stinking, ungrateful, acrid Fume, cooling it grows thick, and then one Part coagulates into a folid Mass, and

the other becomes more fluid than before.

The Come of a live Heart being cut off, and the Point erected upward, the Blood will appear to be driven or propell'd from the Auricle contracted in the hollow of the Heart, but neither to boil or grow hot; this is first to be view'd about the time of Death: These Phanomena hold true in the Blood of the left Ventricle.

Neither does a Thermoscope let into a live Heart inform us, that there is greater Heat in the Blood

there, than elsewhere.

The Chyle in the Thoracick Dust tastes more of the Sea Saltness, or else it retains that Taste as predominant in the Food.

The same taken out, and mix'd with contrary Salts

seldom or never makes an Ebullition.

Received in a Vessel alone, it neither grows hot, washing a man a self-bas week on to

nor ferments at all; neither does that appear in it. while it is contain'd in the Thoracick Duct.

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Nay, tho' collected together there, and thence push'd into the Subclavian, and there mix'd with the Blood, it neither grows hot, nor ferments, no not in the Vein or the Auricle, or the Ventricle of the Heart.

But from these Facts together with tying the Axillary Veins betwixt the Cava and the Valve, we cannot perceive the least Effervescence.

At length, fince the Lympha of the Conglobate glands is now mix'd with the Chyle, and that is the very Issue or Production of the Arterial Blood, the Nature of it is to be taken from the Nature or Difposition of the same Blood, as to this Business. which is known also from the same Experiments.

Therefore there is no Ebullition, Effervescence or Fermentation in the Heart, whether you regard that, or the Liquors that flow into it; nor are we to hope for, or expect any thing of moment from thence. adresided

Likewise the Heat of the Heart will not change the Disposition or Motion of the Blood, as a new Cause neither will it drive it from the Heart.

For there is no Ferment in the Heart; therefore the Cause that drives or forces the Blood from the Heart into the Arteries, from the Veins into the Heart, is not seated in the Mass of Blood, but is to be fought for, in that which contains the Blood. which is the Heart it felf, therefore that such Discoveries may be demonstrated, we are accurately to weigh and confider the Cohesion, Texture, Motion and Strength of the Heart.

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Cavity; with which the Film of the least Femilia

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The Fabrick, Strength and Action of the Heart.

THE Heart hanging free in the Pericardium by four large Blood Vessels, moisten'd with a flippery Lympha, resting on the Septum transversum. betwixt the Cavity of the Mediastinum in the Breast. not too much pres'd with any thing about it, but being tyed to the foft Lungs is fitted for the most commodious Reception and Expulsion of the Blood into all Parts: It has two Arteries arising from the Aorta a little above the Semilunar Valves of the tefe Side, by an opposite course, composing one Canal joyn'd to the Basis of the Heart in its whole Circuit, from whence fending out Arteries, they unite among themselves by various Anastomoses, being distributed into innumerable small Vessels; they fenfibly pervade every minute Part of the Heart, and together with the Veins compose or make up the whole Substance thereof: These Arteries are in Diastole, while the rest of the Arteries of the Body constitute a Systole: But the Veins send their Blood. partly into the Coronaries, and from thence towards the right Auricle betwixt that and the right Ventricle. partly within the right Auricle and the right Ventricle by particular Veins, agreeable to the new Opinions of Vieusfens, Ruyfoh and Verbeyen; these Veins are emptied, while the rest of the Veins of the Body are which contains the bis 110

The Heart hath besides these Vessels Fibres, arising from four orbicular Tendons says Lower, that encompass the four Passages or Entrances into the Heart, and a great Part besides that are inserted in them, for there springs from hence. Ift, Small slender Fibres, in the right Road from the Basis to the Cone, posited thro' the outward Parts only of the right Cavity; with which the Flesh of the Right Ventricle is shut in the Systole, and assisted in expelling the

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The Fabrick, Strength and Action of the Heart, 49 Blood. 2ly, Subject to these in the right Ventricle from the left fide of the Heart, ascending obliquely to the right, and terminating in the Basis, they resemble a Cockle shell in their Passage. 21y, Others again lying under these, spreading broad from the right fide of the Heart into the left, embrace both Ventricles in their Circuit, rising up to the Basis of the left fide, they make an opposite Helix with the former Series of Fibres. These are common to either Ventricle, being equally carry'd round them; they constringe both Ventricles with opposite forcible Contractions, perform'd at the same time, likewise compressing them against the Septum medium, they draw together the Point or Cone to the Basis, equally moving on all fides the Heart, with the Contraction of the Fibres. In which Action, they are affilted by another Series of Fibres, which resting upon the former by a various turning, and placed around they coerce and bind'em in their proper Place. the left Ventricle has still two hard Series of Fibres proper to it, the outward of which, however Subject to the former, arising up throughout the whole Course of the left, spirally towards the right, and partly constituting the Septum, ends in the Basis of the left, this intirely furrounds the Cavity, and hath again the like proper to it felf. Laftly, There are others that are subordinate to this Series, which defcending from the left Basis towards the right, with an oblique turning or winding, make up the interior Parts of the Ventricle, and loofing the Septum medium, carry Fibres, that are visible in their variety of Length, Flexure and Intortion. Besides these there are carneous Columns, Holes in the Walls or Partitions of the left, which is the Reason that that Ventricle can be closely and strongly drawn together by a common and proper Contraction; while the other Fibres and little Pillars seated in the Hollow or Cavity of either Ventricle, by refisting or thrusting forward in

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he od 50 The Fabrick, Strength and Action of the Heart.

the Systole, and drawing back in the Diastole, serve

instead of, or supply the Want of Valves.

These Fibres, arising from the Nerves of the eight Pair entring in plentifully, within the Aorta and Pulmonary Artery, hence being inserted into the Auricles and the Heart, by their Muscular force, they occasion the forming of the Cavity of the Heart, accurately or nicely constringing it without destroying its Texture, by a proper and forcible Action. Hence it is evident, that the lest Ventricle is mov'd or acted by a proper orbicular Contraction, the right a semiorbicular, and that common to the lest, as Inspection into the Heart teaches us.

Therefore the Heart and its Auricles, are true Muscles, and are acted by Muscular Strength: Whilst all the Fibres being made shorter at the same time, lessen the length of the Heart, enlarge its breadth, exactly contract or draw together the Capacity of the Ventricles, dilate the tendinous Mouths of the Arterious Passages, determine them to shut and express the contained Liquids with great force, thro their diluted Mouths into the Arteries. This is the

Systole or violent Motion of the Heart.

Moreover to shew how the Blood is expell'd and thrown out by this Muscular Contraction, the leaping of it out upon cutting the Pulmonary Artery, or Aorta near the Heart in a live Diffection teaches us: So it is puls'd out from the Heart, erecting the point upward, and cutting round about the Cone, by pressing the Finger immediately into the Wound; there is a Swelling, Tension, Hardness and Paleness of the Fibres; Contraction follows, Impletion does not precede it; Depletion or Emptiness attends the Shortness, Contraction or narrowing of the Heart.

If the Nerves of the eight Pair be tyed or cut asunder in the Neck, the Motion of the Heart grows languid, there is a Palpitation with the greatest Pain

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The Structure, Force and Action of the Lungs. 51 to the Animal, which in a short time ceases. From hence is dated the Origin and Continuation of the Systole, which yet stands in need of the Blood of the Coronaries, in every Muscle, and of that flowing in the Cavities, fo by the Systole, the Blood being almost totally puls'd out of the Cavities of the Heart and its Vessels, the Fibres Flag, are weaken'd, stretch'd out, or made longer, the Distance betwixt the Basis and the Cone is increas'd, the Pressure of the Walls on the Cavities is lessen'd or taken away, the Valves of the venous Passage towards the point of the Heart are drawn together by the annexed Columns, the contracted Auricles fill the Cavities as well as the venous Sinusses, this is the Diastole or patural Rest of the Heart.

For from that time we evidently know, that the Cavities of the Heart are fill'd with Blood, by opening of an Artery about the Heart, or cutting the Heart transversly when erect, and then we see it admitting not casting out the Blood; from Inspiration of the Animal, opening of it at the time of Death, for then we may perceive a Relaxation by putting of the Finger into the Wound: Therefore the Blood doth not flow from the Heart upon the Account of Rarefaction: And a small Quantity of Chyle added to a great deal of venous Blood, is mixed, divided, and shak'd together by the Strength of the Heart, and then the whole propell'd into the Pulmonary, Artery.

The Structure, Force and Action of the Lungs.

WE are therefore to consider the Fabrick or Texture of the Lungs, as to its Vessels, and the Air and Blood that are contain'd therein; that from thence may be known the Effects happening to the Chyle and Blood in the Lungs. Cafferius and

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Ruysch say, that its Air Vessels are always naturally open from the chink of the Glottis, and form'd by the Concourse or Meeting of the two Arytanoide Cartilages, spontaneously elevated from the pressing down of the Epiglottis, and can emit or send forth Air by the Nostrils or Mouth. But the same Chink depress'd by the Epiglottis, from the Arytanoides being contracted, by the Thyroarytanoide Muscles, it hinders the Admission, and is shut against any other Bodies but Air; but where it is dilated by the positick and lateral Cricoarytanoide Muscles, thence it easily both admits and emits the Air.

From thence the cartilaginous Aspera Arteria, separated from the orbicular Segments, on the postick or back Part, and there surnish'd with a strong Membrane, being conected together with an able Musculous Band, renders it so, that the Air hath always Liberty to go in and out at the gaping Pipe upon the smooth slippery Sides of the Membrane; that it may be capable of expanding round and give way to the Deglutition of the Stomach; that it may yield or be pliant to the bending of the neck; and lastly, that it may be easily lengthen'd and

. shortned.

Afterwards, where it is cleft about the fourth Vertebra in the Breast, a little further it is divided into innumerable Branches, but more abounding with annular Segments, the Branches are posited at acute Angles one after another, by degrees becoming narrower and finer: Lastly, at their Extremities, with a cartilaginous Disposition becoming membranous, being extended by the force of the Air, the folding Bags make little yielding Membranes, the Slips of which grow to every extream point, from which the Vesicles, the Lobes, and last of all the whole Lungs as to the Air Vesicles are form'd or compos'd.

If therefore the fluid, heavy, elastick Air admitted by the Glottis into the Trachea and Bronchia, blows up these Tubes, Branches and Vesicles, the orbicular Largeness and Length of the Pipes will be increas'd: The Branches will rise into greater Angles; the Lobes are erected, the Visicles from a flat Figure by Complication are extended into a round one. Hence the Spaces will be enlarg'd betwixt the squammous Segments, the Branches and Vesicles, and the Points of Contact lessen'd.

After this, the Pulmonary Artery growing presently curved from its Rise out of the Heart, is divided into innumerable Branches, distributed with those of the Aspera Arteria; it compasses the Superficies with the last Branches, by the Net work Texture of the Vesicles, possessing the middle Spaces betwixt these, after the like manner, which are call'd little Cells, and there abounding with an infinite Number of Arterial Inosculations, proceeds into the Veins.

Which, as Ruysch observes, from the like bending or winding of the Artery, the Blood is so conveyed and changed, that the overflowing Secretions being scarcely distributed, they are brought back into the larger Pulmonary Veins, into the four great Vessels, by these into the venous Sinus of the Lungs, from thence into the lest Auricle and the smooth Cavity.

From which Texture of the Lungs, and their Mutation by the Air, together with the swift thorough Passage of the Blood and Chyle, are understood the Essects produced in the chylous Blood by the Action of Respiration, to wit; first that that Humour by the immediate Force of the Pulse of the right Ventricle of the Heart, is thrust or compress'd into a crooked, conick, slexible, elastick Pipe, there being thicken'd and chang'd in the Contact of the Particles, and in the Figures or Form of these the Fluid is dissolved, broke in pieces, or maintained and held together.

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Secondly, From the Motion of the Vesicles inflated in the Lungs by Inspiration, leisurely press'd in fewer points; from the Change of the cellulous Spaces at the same time successively more encreas'd, from the Motion of the Vesicles and their Spaces, fuccoffively and by little and little lessen'd in Expiration, from the Elasticity of the Air, retain'd after Inspiration or Expiration, from the affiduous Increase by Heat that is perform'd; that for two moments fuccessively together; neither the Arteries nor Veins, nor Blood, or any other Humours in what foever Vessels of the Lungs, are ever equally or after the same manner compress'd; but all ought to be adapted to the conveying Canals, which follow through the Lungs, by being reciprocally presi'd, driven, conquassated, remitted, ground, broke to pieces and refolved.

Therefore 3ly, the Chyle is prepar'd in the Mouth, wrought in the Stomach, elaborated in the Intestines, secreted in the Lacteals, diluted by the Glands in the Mesentery, yet more so, from the Chyliserous Duct of the Thorax, jumbled together in the Vena Cava, accurately mix'd, soluted, attenuated and subdued in the Auricle, and the right Ventricle; strongly squeez'd or press'd in the Conick and Cylindrick Canals of the Pulmonary Artery, and configurated into the Form of the solid and sluid Parts throughout

the whole Body.

4ly, It is exactly mix'd again in the Pulmonick Veins: And 5ly, By the Lympha in this Place, as demonstrated in the Blood, alter'd in its proper Organs, it is diluted in the same Veins. 6ly, It appears to be endowed with an apt Form for Nutrition: Then 7ly, Its Heat and Fluidity are preserved. 8ly, Thus is made the highest Mixture of all the Humours and Particles of the whole Body, both new and old. 9ly, And here seems first of all to be the Rise or Spring of that red Colour, which is the Property of good Blood.

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But whether the heavy Parts, and the elastick ones of the Air, are mix'd here with the Blood, for the vital elastick Oscillation, as the Famous Borellus teaches? That cannot be done in the Arteries, neither is there any Argument why it should in the Veins. But the Air compressing in Inspiration, is believed to pass thro' the Vesicles or Bladders by extending the Veins: The compressing Force of the Breast binding the Veins in Exspiration; here is a singular Commutation of the Artery into a Vein; the Passage of the Air is difficult into the small Pores or Holes that are pervious to Water, Oil, and Spirits.

The Blood is brought hither to be expos'd to the Air, either as a Refrigeratory, to expel the fuliginous Vapours, or to endow it with Spirits according to the Schools: But ocular Demonstration, Anatomy, and the Use of the Thermometer prove other-

But whether we may admit the Blood of the right Ventricle, by reason of the fervid Effervescence in that Part, that is almost scalding or boiling hot to be condens'd, extinguish'd and refrigerated by the cold nitrous Air in the Lungs; for Sylvius and most of the Chymists were of this Opinion, but Experience reclaims it; or whether the Blood gains its Purple Tincture, from the subtil nitrous Air mix'd here with that Liquor, as the great Lower wou'd have it, yet Truth does not much favour him.

As we may learn from the former, so we may from the Event, that the Chyle is rather confusedly jumbled together in the right Cavity of the Heart, than accurately mix'd with the Blood; for we fee it intimately united in the left Ventricle of the Heart, and know it able to perform all its Operations from the Strength and Efficacy of the Lungs. After being thus chang'd, it flows from the strait Arterial Canals into the broader Veins, it is push'd on by opposite Motions, is less press'd, but rarifies much

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more, hence growing more frothy, florid and red, it returns into the left Ventricle of the Heart, by this means a great Part of it is mixed again in the left Auricle, where it remains fluid, and is hindred from

Concretion and separating into Parts.

The Chylous Blood hardly resting in the left Ventricle, being puls'd by the strong and swift force of the Systole into the great Artery, protrudes whatever is before it, and so moves all. Therefore the Efficacy or Power of the Lungs is of much greater moment, than that of any other of the Viscera; because the whole Quantity of the Vital Fluid passes thro' them, while only a certain Part or Portion flows thro' any of the rest: Nay, farther here is Preparation made for Nutrition, because all the Chyle is brought hither, then in the first Place, this is the Office or Laboratory of the Blood, where it is made fit to flow thro' the smallest Vessels, which it could not otherwise do; wherefore it is most aptly prepared for Secretion; and lastly, for exercifing all other Actions, which are necessary to be perform'd towards the Subliftence of Life and Health.

All these Things follow from the Disposition or Nature of the Blood and Chyle, as laid down, allow'd, or presuppos'd, from that of the Structure and Action of the Lungs, from the suppos'd Strength of the Heart, and the Force of the heavy, sluid, elastick Air, on the configurated Air Vessels of the Lungs, together with those of the Blood. Therefore, what need of the Admission of Air or a Ferment? Those who are desirous of knowing more on this Subject, must consult the Works of the Learned Bellinus, Pitcairne and Malpighius, who are excellent in their Enquiries into the Nature, Structure and use of the Parts.

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The Strength of the Artery, and its Action on the Fluids.

That those things may be farther understood, which relate to the Pulsation of the Blood and Chyle into the Aorta, and its remotest Branches, we ought to regulate our selves by the Hydraulick Laws, with which the Fluids are directed by a supposed Swistness thro' known Canals, and lead about towards a definite End: For these are otherwise demonstrated, and common to any Liquor moved thro' any Vessel. Their Swistness are here measur'd from their Causes and Essects observed by the Senses, or known by good Reason, but Canals are known from Sense, Microscopes, Injections, Reason, or by this Rule, as things either sensible or insensible in a Human Body.

Therefore the Artery, by the Force of the distending Blood, is expanded, but when that ceases, it naturally returns to its former Capacity; for the Finger thrust in forcibly, is much squeez'd, but taken out again, it contracts of its own accord; in a live Animal the Artery appears full, in a dead Body small and almost empty; it resists being distended when blown into, and strongly repels the Impulse of the Air; sticking in the smallest Diameter of its Contraction it is at rest; wherefore its contractile Power depends on the Nature of the Fibres, and the little replete Vessels constituting the Membranes of the Artery.

Neither is there any sensible Particle in the whole Body, but it hath a small or minute Artery, as slight Wounds informs, or we may learn from the Micro-scope and Injections, according to Leenwenboek and Ruysch; yet all these are but lesser Branches of the Aorta.

The

The Blood filling the Arterial Vessels, stops its Pulsation into the Aorta, the Conick Figure of the Artery, its Curvedness and Elastick Spring; the ambient Bodies pressing with their Weight, and lastly, the Narrowness of the Capillaries or remote Vessels does the same; therefore it slows thro' the Vessels from the Excess of the Heart's Strength, beyond those aggregate Bodies that resist; from whence it is apparent it may be driven thro' the Lungs with lesser Force of the Heart.

Yet the Strength of the Heart is accounted great, let us compute which way we will, as the quantity or plenty of the things moved inftruct us; therefore because the whole Mass of Blood is at all times agitated with such Force, and repell'd or driven back with such a mighty Obstacle, in a full, conick, stexible, and strong resisting Canal; it necessarily follows, that the Diastole of the Artery is perform'd at the same time with the Systole of the Heart, that appearing not natural but violent to the Artery which is natural to the Heart. In a State of Health, there ought to be a Fullness of Vessels every where at the same time; to be felt, where the Artery is found large, naked and supported by a hard Basis.

And while the Force of the Artery is strongly thrust back again, contrary to this Diastole, and also the Power of the ambient Parts, assists that Resistance: The Artery thus supported, will necessarily push on the Blood, otherwise at rest, by the strong ambient Bodies with that Energy, whereby it contracts it self; from whence the Blood will slow with a continued Stream, tho' with leaping, and this is call'd the Systole of the Artery, timed equally with the Diastole of the Heart, which is natural and not violent to the Artery, assisted by the Return of the Valves of the Aorta, and the flaccid Emptiness of the

Coronary Arteries.

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These Motions are two-fold, which the Physician calls the Pulses or Beatings of the Arteries, in which the Strength, Plenitude, Number or Equality consists, or their contraries; yet so, that the same are scarce common to two healthful People at the same time.

From hence the Blood being puls'd from the Heart with an oblique Force, it is thrown to a very acute Angle on the fides of the Aorta; pressing there it runs in almost with its whole substance into the crooked or curv'd Part thereof, from the Figure and Form of which, as well as the Refistance of its Weight, it is press'd back again, therefore in every moment of time, fome Particles of the Blood, gain another Motion, Rotation, Attrition, Attenuation, Denfity, which are chiefly homogeneous to all, and from these follows the Fluidity, Heat and Colour of the whole Mass; a Division of Particles is made and accommodated to all the Vessels, hence Obstructions are hindred or prevented in the Capillaries; all which are affifted by the Anastomoses or Inosculations allowed of by Leenwenboek every where, and by Ruysch almost in all the less and minuter Arteries of the Body.

But if all these should contain Blood in them, and yet want the Motion of the Heart and Arteries, the Blood wou'd soon thicken and approach more to the Nature of a Solid, but while it is urged on from its Causes, it remains apt or dispos'd for Life.

But because the Arteries increase by degrees in Number and Size, in one place narrower or straiter, in another broader, in all times and places many things are lost not to be restored; in the smallest Vessels the greatest Resistance, and that impress'd Force is communicated to many ambient Parts: Therefore the Motion of the circulating Fluids, cateris

60 The Nature, Parts and Phænomena, &c. cæteris paribus, will be swiftest about the Heart, and slowest in places more remote.

The Nature, Parts and Phænomena of the Blood.

DUT in the Blood it self, the great Cause of this Diversity lies hid in the Velocity, and in the very Passage thereof; and because there are various things therein, its Origin must instruct us; the spontaneous Secess of Rest, adhering without the Vessels in a vaprous, serous, sibrous Form, and the

Chymical Analysis.

Therefore there are in the Blood, first, things that are moved, or moveable by the least Force, as the smooth round Solids; 2ly, what are slower or duller, and not moveable with little or small Force, as things porous, angular, rough and viscid, from whence we are taught by Hydraulicks, Hydrostaticks and Mechanicks, that the Parts of the Blood are puls'd with the same common Strength of the Heart, and not mov'd with Velocity, Continuation and Direction; for the first recede from the Heart in a direct way, with a great and constant Speed, but the latter much slower, being drove thro' the Vessels obliquely or backwards.

But why shou'd the Blood remain some time sluid in the Veins of a dead Body, and yet coagulate quickly in the Heart and in the Arteries? Because perhaps the most sluid Humors being press'd, slow assiduously into the Veins, and nothing exhales from them, when the Fluidity is lost in the Arteries, nei-

ther does any thing return into them.

And tho' the Blood appears in Life every where alike red; yet viewing it by Microscopes, it consists of red Globules that swim in a thin subtil Serum

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that is almost pellucid; so that the Balls blown up or form'd out of the six lesser things, are red, but resolved into Parts, they transform themselves into the Nature of a pellucid Serum, of which there are various Colours. Whence Matter, Substance, Figure and Colour are converted into Water; it is more dissicultly understood, how this Division is extended into lesser Globules, but it is known what

the thicker red, and what the serous make, and therefore why they are so necessary in the Blood of a

found robust Man.

But from these things it will be easy to explain. what we ought to think of the Galenical or Chymical Doctrine, in accounting for the Nature of the Blood; and conclude that the Variety of Blood in various Bodies, and from thence the Temperaments of different Men may be better understood, and deduced from Water, Salt, Oil and Earth; in the mean time it is clear a posteriori, that the Motion. only of the circulating Blood can perform and preferve its Mixture, Fluidity, Heat and Redness; while Encrease or Decrease, the Absence or Presence thereof maintains or destroys it. Wherefore there is ocasion to look into those things, which are done, while this Blood and Chyle is brought by the Force of the Heart and Arteries, into the Arterial Capillary Vessels about the small Veins, Glandules, Muscles, excretory Organs and Viscera.

The Nature, Disposition and Force of the Arteries entring into the Brain and Cerebellum.

First of all we are to have regard to the Rise and Course of the Carotid Artery; the Aorta, saith Ruysch, arising from the lest side of the Heart; soon after is carry'd upwards, and then forms the Subcla-

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Subclavian by an Archwise bending in the right Side, to which the right Carotid adhering for some space, it rifes as if it derived it felf from this Subclavian: but the left is erected from a fingle Arch. Prefently both of them being defended by a deep Situation and the Aspera Arteria, free from crooked Windings and Compression, scarcely sending forth any Branches, they reach the Cranium in a direct or ftrait Course; where being almost arrived, they bestow, according to Bartholin, an external Carotid, as Lower fays, furnish'd with an offeous or bony Canal, winding or turning forward, laid down with a musculous Membrane, giving Branches with Ridley to the Dura Mater: Within the Brain they are defended from the Sellian Sides, and the Rife of the Dura Mater, after they are sent forth into the exterior Parts of the Pia Mater and the Nerves; and then are committed to the Brain, by means of the Pia Mater, where presently they are divided into lateral. anterior and posterior Branches.

But the vertebral Arteries, which Cowper mentions in his Appendix to Bidloe, being stretch'd upwards from the superior Part of the Subclavians, are prefently receiv'd among the seven lateral Foramina of Vesalius, there defended, and brought to in a direct Road, being supply'd with a vaginal membranous Covering, where they issue out from the Foramina of the Vertebra, immediately under the superior Process, made crooked, according to Cowper and Ridley, from the posterior Bending back of the first Vertebra, and there made broader, they enter in by the great Foramen of the Skull, are united, says Ridley and Ruysch, by laying down a grosser Membrane, then joyn'd to the Carotids, it is presently divided after a

wonderful manner.

Therefore the Four Arteries going out from opposite sides into mutual Apertures, as Ruysch saith, and so set together in an orbicular manner, from whence

Arteries entring into the Brain and Cerebellum. 63 whence they presently send out Branches, which meeting with others of the like nature, they again form such lesser Circles, and by the same Artifice feeming to be divided thro' the whole Superficies of the Pia Mater into Subdivisions, they almost difappear, that this whole Membrane is chiefly made

up of this Texture.

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After this manner, from a mechanical Apparatus, all the Blood is moved or driven from the Heart. which comes to the thin, slender Membrane of the Brain and Cerebellum, and from thence to the Subflance of both these, for the remaining Blood which is driven into the Cranium by the Two Arteries, fays Ruysch, springing from the external Carotid, entring from thence by a fingle Foramen into the Skull, and distributed in the hard Membrane of the Brain, properly faid to be the gross Integuments of the Cerebrum and Cerebellum, as the Vessels show us when fill'd with Wax, from the accurate Industry of the famous Ravius.

From whence we clearly discern, that the Blood before describ'd from its singular Condition, how greatly foever retain'd in this Disposition, being brought to the lower Superficies of the Basis of the Cranium, is there freed from the Matter of the Saliva and Mucus; or purified from the tenacious Blood given to the Vertebræ, blunted by the Flexure of its Artery, refined flowly in the Caverns made by the Sides of the Ephippium from the Dura Mater; and by opposite Strokes it runs into the Veilels, thro' the rest of the Arteries; from whence, first, it preserves its own proper Nature, or acquires a greater Purity, the too great compressive Shock or Violence weakens the foft Pith of the Brain. 2ly, An exact Mixture of all the Blood brought hither, is perform'd, and therefore the greatest Likeness of it in every Part. 2ly, Attenuation, Levigation, Trituration, Fluidity, an Aptitude or Readiness for ns

Secretion, and an Impediment to Concretion. 4ly, A lesser Vibration of the Arteries, and less Action of these upon the Blood. 5ly, A Supply of the Desect arising from the Unstances of the larger and lesser Vessels, fram'd for transmitting of Liquors, when there is a free Course from every side, into any of them.

The Cortex of the Brain.

DUT those very Arteries, interwoven after so frong a mannner in the fine slender Meninges. as Ruy(ch calls it, as in a Basis, send forth Branches, according to him, from every Part thereof, with almost a perpendicular Course, being made up of fuch alike Apparatus of Inosculations, as furrowing Rounds and Turnings on the Membrane by its Infinuation, and making them deep, into which the exterior Substance of the Brain and Cerebellum, is divided almost to the very Marrow it self. But those Tracts, being wound or turn'd round after the manner of the Intestines, may yet be resolv'd into others leffer, yet like the former. The Substance lastly, that lies betwixt, exceeding the greatest part of this and what is in the Cerebrum and Cerebellum, being fill'd with an Injection of Wax then steep'd in Water, and freed from every Part not full; there will appear an Heap of Veffels. like a Lock of Wool, that are smaller, softer and more fucculent, being dissolveable with the least Force, melting in Spring Water, by hanging only therein, into a pulpy Humour.

The exterior Part, according to Vieusens, is cineritious, or of an ash Colour, soft and moist, and this Substance is call'd the Cortex of the Cerebrum and Cerebellum; it binds in or encompasses on all sides curiously, the whole Origin of the internal Substance

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that is whiter, more solid and dryer, which is called the Medulla or Marrow of the Brain and Cerebellé; so that this in the first place appears plainly to arise from that on every side, both in the Appendixes, Ventricles, Crura and Medulla oblongata; but in the inward part it is like the Cortex of the Medulla spinalis, or spinal Marrow, but of a closer Substance. Tho' in the Cerebelle this is so clear, that the manner how the Marrow proceeds from the Cortex, is made very evident from the Distinction, Proportion and Texture thereos.

Therefore since from every single Stroke of the Heart, a very large Portion of Blood, which Malpighius reckons a third of the whole, is driven from the Cortex with a great and direct Force, that will be agitated at every Systole and Diastole, tho' it be very small. But likewise there ought to be venous Ducts every where posited at the Ends or Extremities of the Arteries, tho' they cannot be made visible, thro' the Fineness of their Membranes and their Substance: There ought also to be certain secretory Ducts, at the extreme Capillaries of the finest Arteries, tho' these are not visible.

This Minuteness of the Parts makes it, that Reason with all its Endeavors is not strong enough to
supply what Inspection denies, as several have
thought; yet the Opinion of Malpighius chiefly,
being every where received, led us into this altogether from the Fabrick of the Gland, till the accurate Ruysch publish'd the contrary, who is a Man
excelling all in discovering, explaining and preserving the minutest Arterial Vessels of the Body,
whatever is to be taken notice of from the Glands,
must be had from the eminent Discoveries of Silvius,
Steno, Wharton, de Graef, Malpighius, Billinus, Borellus,
Peyerius, Ruysch, and Nuck.

Of these, first, some are simple Glands, others compounded, many of these arising from those,

while aggregated or joyn'd together, they are cloth'd with a common Membrane. 2ly, The simple either mix a proper Humour thro' their Lymphatick Ducts, with Chyle or venous Blood; or they exhale into the exterior Parts of the Skin, or the Superficies of the opener Membranes to be found every where throughout the Body: But the compounded Glands emit their Humor or Liquor made in every fingle, Part, from thence, thro' their little Canals into the larger Ducts, and by this common Emissary, at last they break into the greater Cavities of the Mouth first and the Intestines, or else out of the Body it self into particular Uses; the first are call'd conglobate, and the latter conglomerate Glands.

The simple Glands are compos'd of, first, a certain exterior and thin Membrane, to which another being plac'd under, strictly adheres: The former incloses, binds, and compresses it on every side with its circular Elastick Fibres; chiefly consisting of a Texture of small Vessels going in and out: The latter is indeed thick and stronger, with Fibres appointed for almost every Turn and is made up of an intricate Texture of Vessels, which serve it formly for the same Uses. 2ly, These Glands receive Arteries, the Branches which they distribute and maintain in their Membranes by an orderly and fix'd Series. fo accurately or nicely brought to every minute Particle of the Gland, that Wax or Quicksilver being injected, increases the little Arteries, by compressing the other Vessels, that it feems falfely to teach us, that its whole Structure was only Arterial. 3ly, These Glands have Veins dispos'd in the like Course with Arteries. 4ly, They receive many Nerves and those greater than any other Part of the Body, of fuch a Size which are likewise so divided in this Corpuscle, that they seem to enter the reft. 5ly, They have last of all rece-

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ding and communicating Lymphaticks, according to Nuck.

But these Canals of the Artery are conick, inflected, ramous, elastick, wound round or wrapt up, and in the Extremity Cylindricks, not branching further, but are now chang'd into Veins; but before they are thus chang'd, the little Arteries, by infinite Inosculations and various Positions, so communicate amongst themselves to innumerable Angles, that as Ruysch says, these extreme Ends terminate different-

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Therefore great Motion happens from the Arterial Blood, being driven to the Glands; vast Resiflance; Compression; mutual Pressure on the Parts; oblique Pressure; an assiduous thorough Change of touching; Application every where manifold, and that to the least or smallest Points of the Canals; various Rotation every Moment in 'some particular Part; opposite or contrary Pressure, departing into the Branches; but returning into the same, Attenuation, Attrition, Conservation of Fluidity, Solidity, Smoothnels, Secretion, Mixture.

In the mean time, most part of the Branches arifing from the Trunk of the Artery, are more compress'd, stopping in the same Place, so it is in the minutest; and therefore the extreme Branches are less in the extreme or last Trunk; the last Trunks transmit the red, thick part of the Blood, which they deposite into the Beginnings or Entrances of the little Veins; the straiter or narrower Branches receive the thinner, more fluid, pellucid Parts, lesser in the Diameter of its opening, being press'd by an

oblique, strong opposite Force.

But this subtil Humor, separated from the gross or thick Part, is not the Blood it felf, but something else different from it; Sweat, perspirable matter of the Pores, Tears, Ear-wax, Mucus, Spittle, Snot, Lympha, Serum, Bile, Semen, Oil, Milk, Fat, &c.

Furthermore, the last Branches are term'd Arteries from the Nature of their Fluid, and are often endowed with the Properties of an Artery, having the finest subtil Arterial Branches, as well as venal ones: Hence Veins and Arteries are of equal Use to the Lymphaticks, as to convey or carry Blood; neither is it known where the End of their Progress is, but only as we understand the Origin, Progress, End and Function of the Lymphatick Vessels.

Yet the Branches perhaps of some such like Artery, not so much branching, as strait, and disposed in a fine thin Membrane of the smallest glandulous Bag or Vesicle, their Mouths being open in the end, they spue out their Liquors into a common Cavity made from that little Membrane, where being collected on all fides, it adheres fomehow, and is that glandulous Lympha there made and gather'd to-

gether.

But credibly it may make the Nerves of the Glands from such alike Apparatus, spue out their Spirits, and mix them with the Lympha, and so supply those Duties that depend on its Nature. In the mean time, the Lymphatick Arteries often bring their Lympha deliver'd from their valvulous little Veins, call'd the vasculous Lympha, to these Glands, and fend it by a different Preparation of the glandulous Lympha into the same Bag, and mixing with the Spirits, render what is fent in more subtil. that compounded Humor passing thro' the Lymphatick Veins, agitated by the contractile Force of the fibrous Membrane, the Motion of the Artery and Pressure of the Muscles, is push'd into other Glands that are there, at length passing it into the Cistern upon the Loins, the Thoracick Duct, or the fanguiferous Vessels of the Body, and these conglobate Glands are feen throughout the whole Body.

But there is another Reason of other things, while that little Bag or Bladder expells its received

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ed or Liquor immediately by its Emissary into some common Cavity; as into the frontal Sinusses, the Hollows of the upper Maxilla, the little Cells of the Sphenoide Bone under the Ephippium, the lurking Holes of the spongy Bones in the Nose, the Cavities of the Nostrils, the Furrows or Trenches of the Tonsillae, a secreted Mucus is deposited, collected and chang'd: So the Passage of the Mouth, the Ear, Jaws, Larynx, Aspera Arteria, Bronchia, Gullet, Stomach and Guts, appear to have in the mucilaginous Glands; which may be call'd simple excretory ones.

There are others again with the like Appearance, that emit digested Humors thro' proper Emunctories, arising from a Cavity that is without or upon the Skin. Hence we may take notice of the distance of the Artery from the Heart, its Situation in respect of the Heart, and the Trunk from whence it arises, its various Complication, the different Swiftness thro' it, the fingular Proportion of the Branch to the Trunk, as well as the different Force expressing within and without, the Stoppage or Test of the Fluid in the common Duct; the Distribution thereof into Places that change or alter the Humors again by their Structure; the most liquid Part of the secreted being exhal'd or separated, makes it so, that from the same Blood, a Humor abounding with great Variety is secern'd in different Places, and the secreted wonderfully chang'd.

Those Causes that are different in different Parts of the Body, either alone or combin'd are discover'd in the very Structure it self, naked or expos'd to the Senses, or are deduced from the Fabrick, with the greatest Evidence by certain mechanical Laws, and by the easy Knowledge of the Nature of the Humors in all, from whence then may be understood the innumerable Species or Kinds of Secretions and things secretary

tions and things secreted.

Further, not to puzzle the Cause with Fiction, we do not allow of Pores, to be endowed with any certain, various or immutable Figure, especially since it is repugnant to the Laws of Nature to allow of any such; much less to be an Advocate for any conceived Ferments, from a kind of thick or sluid Mass; or any other Fermentation, Precipitation, Coagulation, Assimulation or Alteration; since for these there can be ascribed no Cause, original Matter, Place, Mixture, Efficacy, Proportion, Dura-

bleness, Effect or End.

But from these simple Glands describ'd, or from others like to them, united among themselves by common Vessels, and all together connected by a common Membrane, are produced compound Glands, call'd conglomerate; in these there is chiefly one common Emunctory, which receives the Humor fent in from the rest of the Emunctories of the Parts, collects or gathers it together, and pours it out into some large Duct or Cavity: Such are those of the Innominata of the Eye, the Parotid and Pancreatick Duct, together with that common Receptacle ending in an Emunctory, which often goes as it were into an Arterial crooked Vessel, changing or altering the Humors, and from thence pouring them out by an Arterial Apparatus into an open Channel, as in the musculine Testes, in Highmore's Duct, in the Epididimis, the Vas deferens, and the Seminal Vesicles; or 2ly, it presently breaks out into the common Emunctory.

Here we ought to know, that by Affistance of the Glands, there is separated from the Arterial Blood, Water, Lympha, and a thin Serum, and with these are mix'd Salts, Spirits, and the subtil Parts of Oils; but all these things, either stagnating in certain Places, are chang'd and accumulated, or else are driven thro' the lesser Vessels, even to the minutest Parts of the Body, serving for Motion and

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Nutrition; from whence they either return by the little Veins into the Heart, or else are exhaled; lastly, that Part of the Blood, which after this Labour remains in the Arteries, enters the Veins, which by little and little grow wider, in order to be mix'd with the like Blood, to be diluted with the Lympha, and return into the Heart.

Wherefore the Arterial Blood being most diluted about the Heart, grows by degrees thicker in the End of the Artery, that is in the Beginning of the Vein thickest, easily concreted, and is highly viscous; therefore it requires an unactive Vessel to prevent it, and the Mixture of a diluting Humor, that is, the Lympha, which performs it by its Ossice, and the Return of the Spirits towards the Heart: But these things ought to happen before it is puls'd into the Pulmonary Arteries; for otherwise the Blood wou'd be sufficient to do it with one single Circulation only.

Hence we ought to know the Place where the Certainty of Life and Health are chiefly to be tryed or hazarded; to know what Service the larger Vessels, the grosser Humors, the small Vessels, and the sine or subtil Humors afford to the Strength, Hardiness and Flexibility of the Body; to understand why the Veins by degrees more open, yielding to the Concourse of Humors, and apt for Dilution, perform these things before the new Return of Blood into the Heart.

But some Glands seem to be form'd from another Structure; so that the Artery conveying the Humors, gives a thicker Blood by a social Vein, that opens by Anastomoses, from the Artery into the Vein; but going on from thence alone, and complicated in Windings and Turnings, from its last Mouth it throws into the common Receptacle a singular Humor, prepared and rising from the Blood, but distinct

or differing from it.

Therefore fince Hippocrates, Wepferus and Malpigbius, have diligently compar'd the Cortex of the Brain, with the Structure of a Gland, being convinc'd by the Eye from the plain Resemblance, they were of Opinion, that the Cortex was really glandulous. But Malpighius hath defined these Glands to be angular and of an oval Figure from the Compressure of the neighbouring or adjacent Parts, posited crookedly and small, being tyed together with others, first of all making them a little bigger; from hence again growing large, at last from a Collection of these together, making a Substance like the Convolution or Winding of the Guts, and from these the outward Cortex; so that the minutest or smallest Sprigs of the Carotid and Vertebral Artery, being here wound up into the Structure of a Gland, by their infinite fine Mouths they may exhale a subtil Humor from the approaching Blood, filling drop by drop from its little Bag or Bladder, from thence afterwards is driven into the Emunctory, and from that by the little Veins reduced into the Sinus.

The Eye and Microscope both favour the Opinion of Malpigbius; Boiling divides the Brain as it were into little delicate Substances like Glands; a Deterfion of link being poured on the Cortex, describes little Pieces distinct with Clests or Chinks; the Concretion of a morbous Brain into a Stone, is like a Mulberry; the Corruption of the same contused, by opening of the broken Skull, is like a glandulous Fungus; the Change of the Parts constituting the outward Brain by a Droply, as into plain

little Globules or spherical Bodies.

But whether that last extreme little Branch, is rather it felf made from a strait Continuation of the fibrous Part, afterwards drawn out, as the Origin of the Substance of the Brain, as appears from Ruysch, we can draw no certain Argument, because of the Finenels, the Extremities thereof vanishing from the

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utmost point of our Eye sight. Yet it is highly probable, this Opinion arises from many and weighty Reasons, at least the Effects may be understood to be almost the same in either Case.

For this reason those last Sprigs or Branches, or those glandulous minute Bags according to the same Author, fend forth fine white compact Fibres, with which being united together, is made the callous medullary Body, to which the Cortex growing to, lies upon it, and is knit to it, as well in the Brain as the Cerebellum; fo that there is no end of the cortical Substance, where the Beginning is not likewife to be found of the fame callous medullary

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But that cortical Machine fo accommodates it felf to the medullary Body, that it increases not extrinfically by the same means in the Brain and the Cerebellum; but it accompanies the last Appendixes, faith Malpighius of the callous Body, the Ventricles of the Rife of the spinal Marrow, and the oblong Tract of the same without the Brain; yet so that the enclosed Cortex according to Ruyseb, sticking betwixt the medullary Part and the Sinus intercepted in the middle, it is irrigated or water'd with a numerous Quantity of Arterial Vessels.

And therefore in all Parts of the Head, where the minutest Arteries that are scarce visible with invitible Veins, that are yet so necessary as to be admitted here, run together; there this cortical Substance is found, both in the Recesses, Circumvolutions, openings Interstices, and Appendixes, as in the external Superficies, in regard to the Skull; Therefore from every point of the Cortex faith Vieussens, when any medullary Substance pusheth out, that in the beginning of its Rife will be very small, but being joyn'd to other the like Parts, by degrees it grows bigger; and at length, fenfibly rifing out, it forms the Marrow of the Brain, the Corpus Callo-

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fum, the Crura of the oblongated Marrow, the Thalami, or Chambers of the optick Nerves, and agreeable to Willis's System, the oblongated Medulla and its Crura, with the Fungus or Swellings, as well as the Medulla of the Cerebellum, and its Productions into the oblongated Medulla of the Brain; which receiving these into Ridley's Pyramidal and Olive like, Bodies is stretch'd out into the spinal Marrow: But from this Medullary Substance, as well within the Cranium according to Willis, as within the Sheath form'd within the Vertebrae, all the Nerves derive

their Origins.

But fince these first separated Filaments or Threds appear distinct from each other, yet when they are united, they feem to make one compact Body; it is plain we ought to confider these Things. First, Their Rife, Elements and Progress, while single: 2ly, The cruder or boil'd Brains of Fishes, Hares, Sheep and Oxen, in which the manifest cylindrical Fibrils appear weigh'd down after the Form of Teeth, naturally join'd into each other. 2ly, The fine small sanguineous Vessels plac'd amongst those Fibrils, make a plain Division. 4ly, The Cortex pofited betwixt the ambient Medulla, in the very middle of the spinal Marrow. sly, The white Fibres dispers'd thro' the middle of the prostrated Cortex, in the back Part of the spinal Marrow, as yet latent within the Cranium, and to the Sides of its beginning, yet being in the Cranium, best of all in the Appendixes of the callous Body, and in the Cerebellum it felf. 6ly, The Collection and Distribution of the Medullary Fibres into the oblongated Medulla and from that into the Nerves.

Such a Course or Progress of these Fibres is plainly discern'd: First, From every Part saith Vieusseussens of the cortical Sphere surrounding the Brain, these distinct Fibrils making as it were the Center of the Sphere; so that in the first place they form the

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Medulla, but afterwards reflex from that, they are brought together, on the upper Part, into a callous Body and an Arch, but below, into the anterior and posterior Crura of the oblongated Medulla, and into Willis's annular Bunch or Fungus. 2ly, Rifing and collected after the same manner from the Cerebellum, they are committed to the preceding ones gather'd together; but so, that they joyn by these three different ways. 3ly, Hence all being united from either Origin or Beginning into one Bundle, they form one spinal Marrow according to Vieusens. 4ly, Malpighius saith, that from the Cortex within that, arise the like Fibrils on every side, and from every point thereof they joyn themselves to the Superficies of the Medullary Cava, are united with that, and give a new Increase thereto.

Therefore since this Fabrick or Structure is thus constituted, there is an evident Reason for the Substance, Figure and Position of the Cortex of the Brain; and it is plain such like cou'd not conveniently have been, unless there had been Cavities and Ventricles, from whence the Necessity of 'em appears, whilst they are of use together, that a mutual Impediment is removed in every Part of the Cerebrum, and so Liberty given to the whole Marrow; from whence also the Rise of the Swellings or Bunches is discover'd, which are found in various Places in the Brain, while there are fresh Supplies of Medullary

Fibres that happen in different Parts.

But it is scarce credible that the Medullary Fibres of the Cerebellum, from the inferior Place of their Connexion, should ascend backwards towards the Fore Part of the Medulla oblongata, and from the Nerves there arising out of the Medulla of the Brain, give likewise some that spring from the Cerebellum, always preserving an accurate Distinction of its Origin, Progress and Function: For it is manifest in contemplating, according to Vieussens, the various Insertions

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Infertions of the Medulla of the Cerebellum, into the Medulla oblongata of the Cerebrum, and from thence the growing or rising Substance thereof; as also from the Consideration of Willis's spinal Nerve, out of the very Sheath of the Vertebra going backwards into the Cranium, that it may join it self there to the Nerve of the eighth Pair. But the rest of the Fibres of the Cerebellum are so mix'd with the Fibres of the Brain, that there is scarce any Part of the whole Medulla oblongata and spinal Marrow, where the Fibres as well of the Cerebrum as the Cerebellum are not found mix'd together, and therefore enter the Composition of the Body of every Nerve, always and in every Place concurring in different and distinct Effects.

Whoever contemplates, 1st, the explicite Nature of the Cortex, and from thence, the distinct medullary Fibres arise: 2ly, Also the Resemblance of this Operation with every other Part of the whole 3ly, The vaft Supply of fine, pure, moveable, arterial Blood, not deprived of the subtil Part, but driven thus far by the great force of the neigh-bouring Heart. 4ly, The subtil Liquor or Juice open'd betwixt the Medullary Substance, every where to be discover'd by the Taste or Sight, and first of all found out by the Microscope, which is oftentimes much augmented in Disaffections of the Cerebrum. sly, The Veins from the Pia Mater, the Cortex of the Cerebrum and Cerebellum, returning the Blood back again into the venous Sinuffes by the Veins from the Heart. 6ly, The affiduous regular Proportions of these very Stamina, from the first point of Life to the last Period, their increase Nutriment, fpreading Shoots and Reductions; he must judge these flender little Canals to be pervious, which receive into them an Humor or Fluid which is indeed the subtilest or most refined of the whole Body, prepared pared by the wonderful Structure of the Cortex, secreted, and driven by force into these Pipes, from every Part thereof collected into the Medulla ob-

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For if he will again weigh or consider: First, the Nature or Disposition of that Blood, which is call'd hither by the carolid and vertebral Arteries, and its Difference from the whole residuary Mass of 2ly, Its fubtil or fine Structure vanishing as it were into a fleecy Vapour, and flowing of its own gentle accord, thro' the small Arteries arising from the Carotids and Vertebrals, composing by their inscrutable Foldings and Continuations, the Texture of the Cortex. 2ly, The particular Nature of this Humour, which being contain'd in these Canals, can be readily exhal'd of its own Nature, and will not harden at the Fire, but will be presently found evaporated into Air, while the rest of the Humours of the Body grow thick before the Fire; or are us'd to leave much Faces or Dregs behind. 4ly, The Strength and Celerity, which its Effects being daily observ'd teach us, is in the Nerves and Muscles: He may easily believe that the Parts which compose this Liquid, are the most solid, fine, moveable, simple and fluidest of all the Humours of our Body.

For while it is beheld with Microscopes, as Leewen-boeck hath every where shewn, the red Part of the Blood is the thickest of all the Mass of salubrious Humours; at the same time the Serum whose Parts are much siner or thinner, can be divided into Corpuscles of an incredible Fineness as it appears, according to Malpighius in an incubated Egg when the Fætus quickens, where the Humour of the white of the Egg is so successively attenuated, till it is made sit to flow thro' all the small Vessels of the Embrio, beyond Imagination: And in Insects the Vessels that are infinitely sine and various, are penetrated by their Humours, which are yet observed to be much

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smaller in the human Semen, according to Leeuwenboeck, from whom it will appear that the finer Parts of that Fluid seem to be much less than they were

commonly thought or imagin'd to be.

And we may truly affert this Humour to be of a quite different Nature, from that which is compos'd of any Sorts of Salts, that are to be demonstrated by the utmost force of Art; because all its Properties how great foever retire hither, much less can the Oils hitherto known enter into the Composition thereof, fince they are Enemies to the Passages of these Fibres. Neither is it like to Spirits produced from a vegetative fermenting matter; because these if they are simple or without Mixture, they render their Fibres dry, and unable to perform their Funations; wherefore those have an Analogy to the most subtil Water perhaps that of a Spirit, as having the greatest Resemblance thereto, in Mixture, Moveableness, Solidity, Softness, Simplicity, void of Elasticity; yet the Mutation or Change of Liquor in an incubated Egg teaches us, those Things are produced from other matter.

Again, we are convinc'd that there is a great Quantity of this Humour, in every moment of Life, that is free from Diseases renew'd, or made fresh again; notwithstanding the Size of the Carotids and the Vertebrals; the strait Road or Course they take, which is free from all Hindrance or Obstruction, the great Plenty of Blood puls'd, the larger Motion by which it is push'd on, and the Magnitude of the cortical Composition which evidently show it.

And because the Apparatus of the whole Headpiece, is furnish'd with an offeous or long covering; it is not compressed with any ambient Fat, or any other Body, whether Muscular or the like; but the Arteries themselves, and the Sinusses run always in a

direct, secure, Road.

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In the mean while, the Medulla oblongata and the spinal Marrow being compos'd of a Collection of medullary Fibres, emit or send forth from within the Cranium as Willis saith, in Twenty different places, Ten Pair of Nerves salsely so call'd; many of which being indeed compos'd of several distinct and large Nerves. But Vieussens affirms, that out of the spinal Marrow, there issues from without the Cranium, after the same manner Thirty Pair of Nerves; and one Pair out of the Sheath of the Vertebræ of the Neck, about the sourch Pair of Vertebral Nerves, which increasing by degrees as it rises in Branches and Thickness, is joyn'd to the eighth Pair.

All these Nerves, while they are hid within the Medulla are pulpy, from their very Rise out of the Medulla, they derive a Sheath from the Membrane call'd Pia Mater, defended with which they proceed to the Dura Mater, which is bored through, transmitting the Nerves into open Sheaths, stretch'd out even to the very Foramina of the Cranium, and there with this Sheath taken to it felf, they pass thro the new first Pairs, and the accessory Pair, with a wonderful and fafe Course out of the Cranium; but the other Thirty and One Pair arising by the artisicial Spaces, amongst the junctures of the Apophyses of the Vertebræ, grow broader as they descend downwards: From whence iffuing out shortly after, as Ruysch says, firmer, harder and better fenced, or cover'd, they are dispers'd thro' all the smallest Parts of the Solids, as already observed.

But the Coverings of those Nerves, according to the last named Author, are every where supply'd or furnish'd with sanguiserous, lymphatick and other Vessels by a close Texture, from whence they are necessary, not from the Nerve alone as such, but from the Collection thereof and Fibrils, to show an intelligible Phanomenon of many Diseases in the

Nerves.

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But where the last Ends of the Nerves entering the Parts to which they belong, deposite again the Coats or Tunicles they first acquired or receiv'd, a little after they are expanded either into a fine thin kind of Membrane, or else into a soft Pulp.

Whoever considers diligently: First, That the Medulla or the whole vasculous Marrow is bestow'd or confumed in forming the Fibrils of the Nerves, nay, that it is spent upon 'em, by a single continued Extension. 2ly, That from a Compression, Decision, Putrefaction or Waste of the Medulla of the Cerebrum or Cerebellum, every Action accustomed to be done by the Nerves, arising from thence presently ceases, although the Nerves remain whole, and the Membranes are untouch'd. 2ly, That the Nerves themselves every where being lax, hanging, crooked, going backward or oblique, yet readily perform their Office of Motion and Sense. 4ly, That being compress'd or bound, tho' whole and perfect, the Nerves lose their whole Power of Motion and Senfation in those Parts, which is betwixt the Ligature and the extream Parts, to which those Nerves are firetched; but they maintain their Faculty or Strength betwixt the Place of the Ligature and the Medulla of the Cerebrum and Cerebellum; he will certainly conclude, that the nerveous Fibrils constantly receive an Humour from the Medulla, and transmit it to every Part of the whole Body, by diffinct Pasfages, and that this is the Method only, by which every Function is duly perform'd.

Neither is there any other way whereby to establish an Opinion, unless we affert, that the Nerves perform every Action by Vibration, depending on a tense Fibril Pulsation, which is repugnant to the Nature of a soft pulpy flaccid Nerve, and especially to that accurate Distinction, whereby the Objects of the Senses are represented, and the Muscular

Motions transacted.

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Therefore as the Arterial Blood and Lympha is perpetually moved or driven into all Parts of the Body, made up of such Vessels; so we understand in every moment of Life, that there is an Humour propell'd from the Cerebrum and Cerebellum, by the force of the Heart and Arteries, thro' the Nerves, into every point of the Solids, and that this Humour is prepared from the cortical Cerebrum and Cerebellum.

At length the Tenuity or Firmness of Rursch's vasculous Fleece in the Cortex, which as yet is only Arterial at first, and therefore incredibly thicker in the last lateral Emissary deriving it self thence, teaches us how slender those nervous hollow Stamina are; but the great Substance of the Brain compar'd with this Smallness of every Fibril, demonstrates the Number of them to lie much beyond the Limits of Imagination: Again, the great perpetual violent Action, makes a Plenty of Humours be driven hither, so that there is a constant Fullness, Aperture and Action of those little Canals.

Yet in the mean while we are perswaded, that the Motion of this Liquid thro' these Vessels wants a great deal of force; although the Number of the Arteries, their Smallness, Crookedness and Texture, as well as the Number, Fineness and Winding of the Nerves, their various Hardness in different Places prove the Motion equal and constant, yet the Flux thereof is small.

Therefore whether it appears wonderful to you, that the Eye cannot trace the Presence or Motion of this Humour. That Ligatures, Wounds, Punctures, Sucktions, Injections, are not sufficient to show it? That the Cavities of the Nerves are not by any Art demonstrable? Certainly he that reflects upon this seriously or trys to discover it, knows not the Nature of those Vessels and their Liquor. But he that trusts to his Eyes, following Art, and conse-

confequently derives the Cavities of Vessels he cannot discern, he certainly knows not the Nature and Reason of the human Body in its Origin, Progress, Operations and Excretions; he understands not the Fabrick or Structure of Infects; observes not lastly, those Things which evidently happen to Plants.

But the Error would be greater still, to acknowledge the thick Lympha that flows from the Nerves cut in the Tail of an Ox or Cow, for that Humour we have now describ'd, neither does a Liquor injeeted into the Carotid of a live Animal, tinging the Nerves, show that they are hollow; nor is a Tumour or Swelling that rifes upon binding the Nerves of a young Man, a sufficient Argument to prove the Enquiry; for that Humour from its Simplicity, Subtilty, Moveableness, perfect Volatility, is call'd the Spirit of the Nerves, and is Vital or Animal; of which hereafter.

But fince it is every moment renew'd, and therefore the latter pushes on the former, its Function is shown from its last Office, to be driven from the utmost or extremest Filaments of the smallest lymphatick Veins, as well about the Glands as elsewhere, from thence to the much larger Lymphaticks; and again from these to the common lymphatick Vessels, which are Veins furnish'd with Valves; laftly, into the Veins themselves and into the Heart; and so to perform a perpetual Course or Circuit, like the rest of the Humours thro' the Vessels.

But whether it feems more probable, that this Humour should be stopt last of all, in the secret Paslages? Or rather to believe that it flows back again into the first, from whence first of all it took its Rife? Or lastly, do we think it exhales from the

Body? Indeed these are not very likely.

At last the Blood of the Cerebrum and Cerebellum being deprived of the secreted Spirits, is driven into the Veins of them both according to Vieussens, from these these saith Ridley into the Sinus or great venous Receptacles, from whence without an Artery attending, thro' the Foramina of the Cranium into venous Bags or Pouches, from thence back again into the internal Jugulars, Subclavians, Cava and the Heart.

In the interim, this Lympha, as it is every where, being secreted from the Arterial Blood, in every Part of the Cerebrum and Cerebellum, like all that which hath been constantly pour'd into the Ventricles, returns here saith Ridley into the lymphatick Vessels, the Infundibulum, the Pituitous Gland, the jugular Veins and Heart; so that there is a perpetual Cir-

culation made of it thro' the Brain.

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All which being understood, will furnish us with Answers to the following Questions: Why the Cerebrum and Cerebellum with their Appendixes are supply'd or fenc'd with a bony Case or Scabbard, and what is the Benefit thereof? Why is there a Vertebral Case or Sheath given to all the Medulla Spinalis? Why are Muscles, Glands and Fat wanting here? Why do not the Carotid and Vertebral Arteries accompany their Veins, but are convey'd by a distinct Course, by other Holes distinct from them? Why is the Blood evacuated within the Cranium into Sinusses posited at certain Places, and why does it not go out again directly? Why do the Veins empty themselves by opposite ways into the Sinus? Why is the Figure of the Cerebrum spherical? From whence and of what Use are the Ventricles? What does the Plexus Choroides make? What Use or Benefit do we enjoy from the Salciformes, and another Process of the Dura Mater? Why does the Cerebellum want Ventricles, is placed separate, and is safer covered than the Cerebrum? Why are not the fost Nerves that issue from the Substance of the Cerebrum and Cerebellum compress'd, but have a free Exit? Whether the Origin and End of all the Nerves terminate in the Pineal Gland.

If we have regard to all these Things, it is manifest we ought to adore that Wisdom that hath so form'd the Vessels here, that there may be an equal and not obstructed circulatory Motion of the secreted Humours: So that a perpetual Heat may be encouraged, equally as well from the Arterial as Venal Blood, which otherwise would be wanting in the smallest Vessels: Lastly, That the returning Lympha may be commodiously convey'd and mixed with the Venous Blood, in whatsoever Situation the Head is placed.

The Blood afterwards returning from the Brain, endowed with its Energy, diluted with the cerebrous Lympha, mixed with new Chyle, Lympha and Bile, pour'd in together with Spirits perhaps and venous Blood into the Veins, received by the Heart, puls'd thence into the Lungs, and chang'd farther by them, reaffumes again that Nature or Disposition which it

had before it reach'd the Cerebrum.

For if nothing that is crude will flick thereto, certainly it is most aprly sitted for every new Apparatus, which will supply new Spirits again from the Assistance of the Texture of the Cerebrum and Cerebellum.

Wherefore also it is probable, that a certain Portion of the whole Mass of Blood may so go and return this way, that is, shall scarcely be mix'd with Blood of another Nature, but here undergo a fre-

quent, swift and more equal Circulation.

Lastly, If we contemplate the vast Size or Sub-stance of the Cerebrum and Cerebellum, the Medulla oblongata, Medulla spinalis, and make a comparison with that to the rest of the Solids of the Body; the great Number of Nerves issuing there from, and distributed every where throughout the Body; the Cerebrum and spinal Marrow are the Basis of the Embrio, from whence the remaining Viscera and other Parts are afterwards generated, as the samous Malpighius

pighius witnesseth: There is scarce any Particle of the Body, which is not sensible, or that moves not it self: We may easily believe all the solid Parts of the Body are made of nervous Fibres, and consist of them.

It will not also be absurd to suppose, that the smallest Vessels in the whole Body arising from an Artery in the Extremity, comes to be like the smallest Fibril of a Nerve, as to Size, yet containing an

Humour therein, and other Properties.

That Part or Portion of the Blood which reaches the Head, but being carried by lateral Arteries, is not bestowed in elaborating the Spirits, but is brought saith Ridley to the Dura Mater, the Cranium, the Pericranium, the Muscles and other Parts incumbent on the Cranium.

The Dura Mater is the Basis of the internal Periosteum of the Cranium, in which these appointed Arteries send forth small Branches to the very Bones of the Cranium, which propagate the minutest Vessels every where, but those are distributed amongst the sine, thin, offeous Plates, which running in with others constitute those subtil Unions, to which Nutrition, Heat, Secretion of Marrow, according to the occasion of the Increase or Decrease of the Cranium is brought about.

Hence the Blood, which from its Solidity, Thinnels, Mobility and Fluidity, next equals that which is bestow'd on or given to the Head, is driven into the Subclavians, Axillaries, Brachial Arteries and those of the Hands; where likewise it performs its Actions by the minutest Vessels, as in those Parts there is the greatest Agility, Motion, Strength, Heat, Swear, and from the same Causes the swiftest Circulation.

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But as it is in other Places so likewise here, the brought Blood secreted and distributed thro' the smallest Vessels is carryed into the Bones, the Marrow, Membranes, Muscles, Fat, Glands and Skin,

where

where the Vessels disappearing by reason of their extream Fineness, there is a Return made by other Vessels, sensibly or by degrees increasing larger, and the Humours are brought again into the Veins of the Hand, Arm, Shoulder, Axillary, Cava and Heart.

For we must understand that at the End of every little Artery, there is placed a little Machine, as it were of a glandulous Structure, from which springs a Vessel that carries the Humour off, which is secreted there, and which is various, being lymphatick, serous, oily, and which also being brought back again in its Vessels, pour'd into the Blood and mixed therewith, returns by the Veins with the rest of the Blood into the Heart. Every Dropsy, especially an Analarca, hath a lymphatick Humour rising in the Parts, the Veins of which being bound; you may discover Fistulous Ulcers, Hydatides, Phlyttena, frequently lod-

ged in the Fat.

From whence that Part of the Blood, whose stronger Texture renders it more immoveable and thicker, is carried according to the Hydraulick Laws, as Casserius says, into the descending Trunk of the Aorta; the finer Part of which faith the same Author, enters the Intercostal Arteries, which performing its Office, and passing with a quick Circulation after the former, disburthens it self faith Barthol: Eustachius into the Vena fine pari, so into the Cava, and returns into the Heart, by which wonderful Apparatus it is brought about, that there is such a free Circumduction or Circulation of Blood, that is no ways impeded by the Quantity of Blood in the Vena Cava; while the Parts exonerating themselves into that Vein, to wit, the Intercostal Parts, and great Part of the Membranes feated in the Breaft, feldom bring any Hindrance or Impediment without great and evident Danger of Life, for which Reason saith Ruysch, there is a free Course from the Ameries into the Veins: Whereby is understood the Reason of its Celerity in these Passages, as also the Frequency of the most acute Diseases happening so often here.

From thence Casserius says, the Phrenick Arteries and Pericardia-Diaphragmaticks, receiving the Blood equally, or alike, from the Intercostal and Vertebral Artery; and here by an absolute Course, discharging themselves into the Phrenick Veins, from thence into the Cava, likewise make way for a free and

rapid Circulation of the Humours.

A little after the descending Aorta, after passing by the Septum transversum, visits the Loins, the Abdomen, the Thighs, the Legs and Feet; from whence the Blood returns by the Veins surnish'd with Valves about the Inserior Parts: But from this same Trunk, here the Arterial Branches are propagated from under the Diaphragm, to all the Viscera of the Abdomen, which may be commodiously divided into such as contribute towards the Chyle, the Urine, and the Sperm, and which perform their Actions by a glandulous Structure.

The Action of the Spleen.

HE Place or Situation of the Sphen saith Vefalius, and its Nearness to the Caliack Artery, as well as its Office for that Bowel, together with the Motion of the Humours thereof, requires that we should treat of that first. It is seated in the lest Hypocondrium, hanging under the Diaphragm, adhering to the lest Kidney, the Caul, and here as if it were the Ventricle, it easily receives the Variety of Pressure, and perpetual Agitations upwards and downwards, from the Motion of the Septum transversum, and the Abdominal Muscles.

This Bowel receives pure Arterial Blood, immediately after it is expuls'd from the Heart, by the

first notable Artery, arising from under the Septum, to wit the Caliack, while the first Branch thereof saith Lower, gives to this a Shoot or Sprig, and the third Branch often bestows upon it three Trunks, or some that is granted from the Aorta it self, for this Reason, that the Liver, the Pancreas, Duodenum and Stomach may receive theirs from the same Vessel; that the Blood so supply'd may be like to that which is bestowed upon the said Parts.

These Arteries according to Drelincourt are pretty large, and exceed those of the Liver by an incredible Size, the Body of which saith Ruysch, at its Entrance in presently distributed thro' the whole Substance, is divided into innumerable many Branches, the Ends of which pass into small Canals that are join'd together, and so collected that they seem to constitute little Glands and so disappear, every where

about the Extremities of the Splenick Vein.

Comparative Anatomy in Men, Oxen, Sheep, Moles &c. the morbid State in a dead Body, with putrified Tubercles swimming in the Spleen, the looking on a macerated or bruised Spleen, teach us, it is not improbable that those Arteries may dege-

nerate into a glandulous Structure.

Yet when the Artificial Impletion of the Vessels according to Ruysch, shows us a direct Passage from these Arteries into the Veins; all the Ends or Extremities of the Splenetick Arteries do not appear for that Reason to be terminated, but to obtain here a variety sufficiently remarkable; which yet no Art can diffincly produce to the Eye, especially by reason of the extream Brittleness of that tender Bowel.

Yet it appears plain, that that is the Structure of the Parts here, which is present every where throughout the Body, where Secretion is perform'd; and therefore that is certainly done in this Place.

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Yet here is no common Emunctory, saith Drelincourt, producible from the Spleen, and the Lymphaticks found there investing the entire Membrane, run only betwixt the Two Splenick Membranes; and also penetrating the interior Parts, they arise not from these Extremities of the Arteries, but from those Vessels which serve for the Nutrition of the

Splenick Body.

Therefore fince comparative Anatomy teaches, that in most Brutes the same Structure is to be found, faith Malpighius, which perhaps in Man is not unlike, tho' by Reason of the great Laxness of the Part, it cannot be demonstrated to the Eye; but it hath a near Resemblance; the Splenick Vein is very large as it enters the Spleen, stretching its Branches every where about, thro' its whole Mass: it hath Foramina conspicuous enough, from thence being further distributed, it seems almost out of Sight, at the Ends of the little Arteries, where those and the Nerves are together; whence it is plain that from the Extremities of those Vessels, and also by the Foramina which are sufficiently large, this Vein is fill'd; and therefore the Blood is not drawn back by the Extremities of the Venous Mouths, from that glandulous Structure; but by those larger Orifices which open into the Venous Sinus, and receive that Humour which can be evacuated thence out of the adjacent Receptacles.

For if the Splenick Artery be inflated with Air, and then the Vein be strictly tyed, that is, distributed thro' its whole permeable Body, and afterwards the Artery, the Spleen being cut off and dry'd in the Air, there will appear besides Arteries, Veins and Nerves, many empty, distended and distinct Cells, made up of erected Membranes of a different Figure and Size, which lye open mutually amongst themselves with a gaping Orifice, and also are im-

printed

printed or drawn into those greater Foramina from the venous Sinus.

The Sides of the Membranes which constitute the faid Cells, are water'd by the minutest Arteries, likewise the small, white, soft, innumerable Corpuscles of an oval Figure, dispos'd in the Membranes forming those Cells, are like a Cluster of Grapes which press or squeez the Glands at every sensible Function.

In the mean while, saith Willis, there are many large different Nerves, stretch'd thro' the Spleen singly, and every where distributed thro' the same, when at the same time there scarce appears to be a sensible Motion exercis'd or perform'd in that Viscera, neither does there seem to be any Sense therein, or is it observed to have been required in it: Wherefore it is scarce credible, that those little Canals shou'd bring hither their subtil Fluid, and also mix it with other venous Liquors brought here.

From hence the first Action of the Spleen appears to be, that the Arterial Blood rich in Lympha and perfect, prepares in the smallest Glands a more subtil Lympha, which it secerns by its particular Emun-Aories, and pours out into the Cells; which is also partly fent into the Splenick Vein. 2ly, The remaining Blood after this Action is return'd by the minute Veins; hence it seems to be cast into the common Splenick Vein. 3ly, The other Number of little Arteries, which invests the Sides of the Cells, pours in an attenuated or thin Mass of Blood from their Arterial Structure, loaded or full of Lympha, opening into the Cavities of the Cells, as is observed to happen in the Cells of the virile Yard. 4ly, From thence that copious Spirit of the Nerves is suppos'd to be carried, deposited, mix'd and daily supply'd. 5ly, All those Humours thus prepared, confounded or mix'd together, stagnating for a time,

by the Arterial Force of the Blood, the Impetus of the nervous Juice, the Contraction of the two proper Membranes and the Vagina, the Constriction of the Fibres so numerous here, the Agitation of the Septum transversum, the Muscles, Vessels and Viscera of the Abdomen, are compress'd, mixed, attenuated, and undergo the same Operations as the Blood does in passing thro' the Lungs.

For which Reasons, this Fluid, free Blood, being full of Spirits and abounding with Lympha, is difficult to concrete, being intimately mixed, not easily dividing into Heterogeneous Parts, but is made of a purple red Colour, and such as is sent forth from this Bowel by the great splenick Vein.

This therefore is the Effect or Action of the Spleen; and consequently it hath no Emissary as the other Viscera have, by which it emits a particular Humour made from its own Structure, but pro-

duces all mixed together.

Indeed it appears most evident, that all the Fruit of this Action arises in the Spleen, but is of no Service thereto; but since every Humour thus made passes into one of the Veins of the Porta and Liver; it is plain the Use of the Spleen is to assist the Liver, and therefore cannot be conveniently explain'd, except sirst we examine into the Effects and Functions of the Liver.

But there are many things otherwise obscure enough to be understood from the Doctrine laid down, and from thence may be confirm'd or proved, as for example.

What does the Situation, Substance, Neighbour-

hood and Suspension of the Spleen signify?

What do we learn from the Position, Origin and

Size of the Splenick Artery?

Why the Animal, when the Spleen is taken away, remains salacious alone, and how long? The Situation of the Spermatick Artery learns us that.

Why

Why a frequent Inclination to make Water follows the cutting out of the Spleen? The Renal Artery informs us.

Whence proceeds the great Voraciousness to an Animal after the Loss of the Spleen? The Situation

of the Cæliack Artery indicates that.

What is the Reason in the first Days of Vomiting and Nauseousness after the Extirpation of a Borboryemus? The same as the former, together with the Pontion of the Nerves of the Stomach and Spleen.

Why is there a Swelling of the Right Hypocondria, and an Encrease of the Liver, after the Loss of the

Spleen?

What is the reason that splenetick and Hypochondriack Patients are so subject to be of a pale or wan Complexion?

What can be the Cause why they are so prone

to Laughter?

Therefore whether the Spleen be made for a Ballance of Weight on that fide, or for Symmetry and Proportion? or whether it is an useless Pondus? or the Error of fleeping Nature? or the Sink and Channel purging melancholy Dregs from the Blood? or it is the Operator and Focus of the vital Spirit, by the radiant Heat of which the Action of the Stomach is animated and encourag'd? or this be the Seat of Luxury, the kind Author of Fecundity, or the niggard Step-mother of Barrenness? whether here lies hid the foft Promoter and Nourisher of pleasing Dreams? or it may be rightly term'd the antient Parent of Laughter, Mirth, Joy and the Saturnian Age? undoubtedly all these things are clear'd up, by the evident Discoveries of the accurate Malpighius; nor is it made more probable to support the Nerves dilated hither, and made to distribute the Spirits thro' its whole Region; neither can it give less than universal Perfection to all the Blood.

The Action of the Omentum or Caul.

DUT while that Blood is prepared from every D Part of the Spleen, faith Vefalius, thro' feveral venous Ducts, it is at length poured into the great Splenick Vein, as from its Duct it is thrown into the Vena Porta, and from thence into the Liver; in all this Course the venous Blood from the Caul, is mix'd with it by its own proper Vessel, agreeable

to the fettled Law of Nature.

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The Connexion, Situation, Structure and Infertion of the Caul, consider'd by the illustrious Malpigbius, and conferred together with those which that industrious Anatomist hath detected in the different Bodies of Brutes; teacheth us the same from the omentous Arteries, distributed about the little Bags or Cells of Fat, into fine reticular or Net-work Unions, and there ending in Veins placed in like manner there, which by the Help of lateral Emissaries betwixt the Bags of Fat, secen or separate a thin subtil Oil from the Blood, which they there collect and keep; fo that at last from these Bags united together, and opening into certain Ducts, this collected Oil is expell'd, and so may be conveyed forward to the Liver, and by the same reason pour'd in, and mix'd with the splenick Blood.

It likewise appears probable from the Apertures of the minutest Vessels, lying open every where in the Superficies of the Caul, that there is infinuated into them a fine Vapour, that arises constantly in the warm Belly, from a fubtil Dew dropping there, thro' the small Mouths of the exhaling Vessels; whereby they are always found and observed to be hot, and to moisten the Superficies of all the Bodies, adhering to or within the Peritonaum. But it is necessary, that this subtil and somewhat volatile Humour shou'd be allowed; for we are made sen-

fible thereof from its Rife, Nature and Odour, that diffuses or spreads it self upon the opening of the Abdomen, besides the perpetual Consumption and Refection of the same.

Since therefore the Caul is not observed or taken notice of, to have any other excretory Vessel in Man, besides the Two Veins, call'd Vesalius's right and lest Epiploick, it is probable the venous Blood of the Caul, enrich'd with Lympha and Oil, pours it all out to be mix'd with the slowing Stream in the Liver.

From whence may be understood, why in Creatures at rest, the Substance of the Caul should grow to such a Bulk? and why on the contrary, in Animals that use too much Motion, the Vessels shou'd rather appear sull of Serum, than Fat or Oil? Also why in emaciated and Hydropick Bodies, these Vessels are almost always fill'd with a thin Serum? Lastly, that for the Encrease of Motion there is required a greater quantity of collected Oil, being derived towards the splenick Vein, and at length the Caul adhering to the Viscera that are almost void of

any Fat.

But to the same Blood also, that venous Part is mixed, which returns from the Texture of the Ventricle by Vesalius's Vas breve, the lest Gastro-epiploick, the great Gastrick, the right Gastro-epiploick, and the Pylorick; which being destitute of that, distills into the Cavity of the Ventricle, therefore is mixed in divers Places to the returning Blood from the Caul; and perhaps carries with it a great deal of the subtil Humour, which it drew from the siner Part of the Aliment, either Eatables or Drinkables by the

absorbing Vessels of the Stomach.

But the smallest Branches from the Pancreas, and the internal Hamorrhoidal, from thence also draw their Blood, which perhaps is a little more acrid than the rest.

Laftly,

Lastly, All the Blood which was brought into the Mesentery and Intestines, by the Help or Assistance of the upper and lower Mesenterick Artery, and there exercised, returns into the Mesenterick Veins, and at length is mixed with all these Humours before its Entrance into the Liver: And this last wants the Conveyance of Lympha into the Cavity of the Intestines; but being again surnished with a thin Bile and some Part of the Chyle, it affords Matter that is not altogether useless for making Bile for the Liver.

Therefore the Blood, which presently flows by the Vena Porta into the Liver, is fluid, soluble, attenuated with Spirits and Lympha, rich in Bile, and partly by the Help of Respiration acting powerfully thereon, partly likewise by the Force, tho' more gentle of the Blood puls'd round it, all these different Humours brought from different Parts, are well mixed in the great Channel, into which they run together, that they may be fitter for Transsluxion, Secretion, and thorough Passage into the Veins.

The Action of the Liver.

HE Vena Porta, saith Vesalius, form'd out of so many Veins passing here into this one Tube, elated upwards, enters the Liver about the middle of the hollow of the Superficies betwixt the Tubercles call'd avias; a little further becomes strong and sibrous like the Tunicle of an Artery, with a Coat as a Sheath, forming a Space half an Inch broad, making a Sinus sufficiently large and ample, being driven into which, it is collected and retarded there, this various Humour from the proper Motion of its Concourse and the Action of Respiration, is subdued and mingled, so that being equally divided, it proceeds on its Course.

Presently after it issues forth after the Nature of a Vein and a Sinus, and being, according to Glisson, dispers'd into many Branches, and from thence into innumerable lesser ones, it reaches almost every minute Point of the Hepatick Body, so that at last its Extremities escape our Eyes, and so constitute every

Part of the whole Substance of the Liver.

Thence the Hepatick Artery arising from the right Branch of the Caliack Artery, entring the Liver near the minas, it infinuates it self into the Substance of the Vagina, being distributed thereby, and divided even to the minutest Parts, it reaches all, or the smallest Places, and so is seen not only in the Tunicle, but in every Part, tho' it passes not thro' this thick Vagina, and so cannot penetrate the larger Vessels. Hence others, saith Ruysch, come from the Diaphragm and the suspensory Ligament, inserting themselves first of all with their Branches; lastly, their Extremities are from the Cystick Arteries.

But the Vena Cava, saith Vesalius, tending upwards towards the Diaphragm, insinuates it self by the Gibbous or Convex Superficies, in the Place of its Connexion by open Passages into it self, and distinct Foramina, receives from the Liver three larger Branches, and several lesser ones; which, saith Glisson, being collected from innumerable small ones dispers'd thro' the whole Body of the Liver, at length bring back the Blood from the Vena Porta, tho', saith Ruysch, they seem to be sewer in Number, and less in Size than the other.

Where-ever the last or extreme Ends of the two said Veins are joyn'd together, they become so small, that being disposed into an admirable sine Bundle, like so many Hairs tyed together; and being thus configurated, they appear, as Malpighius demonstrates, like distinct Globules, arising from close invisible Vessels, separated from the neighbouring ones;

these Corpuscles are likest those which are call'd simple Glands; to be the better satisfied in which, we must apply our selves to the Inspection of Insects, Fishes, Quadrupeds and Birds, and be con-

vinc'd from the naked Eye.

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In which very Places, there is always found a little small Canal, arising from those Kernels by an invisible Spring following the Branches of the Porta, with an undivided Course wrapt up in the same Vagina, and sticking to it, as Ruysch assims, so tenaciously, that it cannot be separated, growing by degrees from the Concourse of the like Pipes, ending at last at the Trunk of the Vena Porta in one Pipe, according to Glisson, which is call'd the Hepatick or Biliary Duct, whereby a various or different Fluid is assiduously received and deduced thence, call'd the Hepatick Bile.

The Contemplation of the Fabrick or Structure of the Vena Porta, the Cava and Hepatick Duct; the Consideration of the Motion of the Humours work'd in the Vena Porta; the Nature of the Humour contain'd in the Biliary Duct; Anatomical Experiments made by binding or tying, cutting and collecting the Bile teach us, that from the Blood brought by the Vena Porta, there is a fluent Humour separated in those minute Places, which is afterwards thrown out of the Liver by the little Branches of the Hepatick Duct, while the remaining Blood by this Labour, impuls'd from the Branches of the Vena Cava, out of the Liver, flows thro' the Vena Cava towards the Heart.

Which thing is clearer understood from the Distribution of the Hepatick Nerve, divided always

the same way as the Vena Porta.

In Men, the capacious oval Gall-bladder adheres to the hollow or concave Part of the Liver, faith Vefalius, passing out into a Cystick Canal or Duct, so that the Neck is deeper than the bottom, from the whence,

whence, with the Porus Bilarius, it is join'd to its own Duct, by an acute Angle, making thus united together, the great common Duct obliquely descending, which, apply'd to the acute Angles, penetrates the exterior Coat in the Duodenum; from thence, descending betwixt that and the other, proceeding forward with this Perforation, with a long Course betwixt the second and third, it makes a free Exit by a round Foramen into the Cavity of the Intestine; all which teach us, that the Bile cannot at all times and in every Circumstance, be pour'd into the Guts from the Liver, but only when the Intestines are relaxed, for upon their forcible Contraction it is not to be done at all.

The Hydraulick Contemplation of this Fabrick, compared with what hath been already delivered, demonstrates clearly, that from every point of the Liver and the Gall-bladder, there is an Humour brought by the common Meatus or Passage, thro' a natural Course or way into the Intestines, where being puls'd from the Ventricle, the Chyle is first of

all lodg'd.

In the mean time, Experiments teach us, that the way is open and ready from the Cavity of the Gall-bladder into the Liver, the Biliary Duct, the Intestines, likewise from the Hepatick Duct by the Liver into the Gall-bladder, the Cystick Duct, the Intestines, and lastly, from the Hepatick Duct into the Cyflick, from this into that: Anatomy informs that the Vesicula is sometimes wanting in Horses, as Needham affirms; otherwise, according to Wepfer, the Hepatick Meatus pours in its Humour from the Cavity of the Bladder; sometimes the Hepatick Bile does it visibly from the Vesicaria; from whence it is very probable; first, That the Hepatick Bile naturally runs backwards and forwards, fometimes into the Bladder, sometimes back again into the Liver and Vena Cava, from thence it flows thro' the Body:

Body: In the next place by stagnating in the Bladder, it acquires the Property of the Cystick Bile. 3ly, But perhaps the bitter Part or Portion is chiefly made in the Glands, seated in the Membrane of the Bladder, water'd by the Cystick Arteries, as in the Membrane of the Auditory Meatus; and then 4ly, From thence to mingle the ressuent Hepatick Humour in the Bladder it self.

Which are more confirm'd by the Discoveries of Glisson, Verheyen and Perault, from the numerous Pipes out of the Liver and Hepatick Duct, implanted into the Gall-bladder, perpetually carrying an

Humour from thence. From all which Authors, the Truth will shine by their Determinations of the following Politions: First, That the Hepatick Artery serves for the Support of Life, Nutrition, Heat, Propulsion of the 'Hepatick Humours, the Secretion and Expulsion of the same. 2ly, That from its Extremities are produced the vaft quantity of invisible Lympharicks, from whence come the visible ones, which end not in the Vena Porta, but in the Cystern of the 3ly, There are Veins receiving Blood Lumbares. brought from the Hepatick Artery, that remains after this Operation, conveying that into a Portion of the Asygos Vein, which is under the Septum. 4ly, All the Abdominal Viscera are serviceable, or contribute to Digestion, the Spleen, the Caul, the Stomach, Pancreas, Mesentery, Intestines, being useful to the Liver only by carrying thither a venous Blood, but what is wonderfully chang'd or alter'd. 5ly, The Veins may be chang'd into Vessels the likest Arteries, from their Structure, Size and Use. 6ly, The Secretions are made from the venous Blood. 7ly, The Portion of the Blood from the Heart, is made from a double arterial and a double venous Pulse, before it returns into the Heart. 8ly, The Trajection of the Humour is flowest here; and therefore, 9ly, The H 2 Con-

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The Action of the Kidneys.

Since we have already treated of the Pancreas, Mesentery, Stomach and Intestines, Order requires that we shou'd proceed to the Action of the Kidneys: Their

Their Situation and Connexion are so order'd, that they may be affifted in Excretion by the Motion of the neighbouring Parts, especially the right Kidney, saith Eustachius, being defended under the Membrane of the Peritonaum expanded round it, and wrapt up in a drier kind of Fat, they receive, faith the same Author, incumbent Glands; and from thence, out of the descending Aorta, a large Branch or more, from thence Four or Five larger ones, from these, many other less; and then again, the fmalleft crooked ones that escape our fight, being distributed thro' all Parts of the Kidneys. Branches of these little Arteries, saith Ruysch, being united and separated in their mutual Courses, form as it were a Clue; but from these last, there seem to arise the minutest returning Veins, as well as lateral Pipes, that are very fine and almost pellucid, receiving and conveying the Urine separated from the little Arteries, and where they are united, they form many pyramidal polygon Bodies, that at length end, fay Malpighius and Bellinus, oftentimes in twelve membranous Bodies, call'd Papillæ, in which many collected Mouths of the renal Pipes stand open obliquely, every where and on every fide as well without as within.

In the mean time, there are, according both to Malpighius and Ruysch, small, round, hollow Corpuscles in the Substance of the Kidneys, adorn'd on every side with little Vessels, made up of Veins and Nerves, almost touching the urinary Pipes; whence the Urine may be seen to be secern'd or separated here, by a double Apparatus, from a glandulous Operation, and that more simple one of Ruysch, which is not repugnant to the Practice of Nature in other Places, as for example, in the Liver.

But the other Part of the Renal Artery, is necesfarily bestow'd for the Support of Life and Heat, by being subservient to the very substance of the

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Kidney: And from the Blood of this, Nuck says, that Lympha feems to arise, which returning in such abundance from the Kidneys, is restored by the Channel of the Chyle, into the great Circuit of the Blood: And without doubt all its proper Veins

spring from hence.

For from the extreme Sprigs of the little renal Arteries, the smallest Veins arise, saith Eustachius, which being gather'd together make greater, unite into Branches like the Division of Arteries; at length, saith he, joyning again, their Trunks, are uncertain in Number, and emit by different ways into the Vena Cava Blood, that remains after the performing their Functions.

Besides, the Papillæ of the Kidneys, the Fluid brought by the urinary Pipes, drop into a large Cavity, made from the expanded Membrane of the Pelvis; from whence the collected Mixture is driven into a Duct made by the streightned Pelvis, call'd the Ureter, from whence it is carry'd afterwards to

the Bladder.

For from the Circuit or Course of the Papilla arile, faith Eustachius, Eleven or Twelve membranous Canals receiving them and the Humour diftilling there-from, which pass into Three great Branches, that being collected into one, make a large Pelvis; which ends in one strong membranous Pipe, made up of Arteries, Veins, Nerves, Lymphatick Vessels and moving Fibres, that is call'd the Ureter, which running downwards, afterwards bending in, under the Lamella of the Peritonaum, it is inserted, according to Vefalius, in the postick Part of the Bladder, scarce Two Fingers distance from the lower Neck, and perforating the external Tunicle or Coat far less than the space of a Finger's Breadth, runs obliquely betwixt this and the internal, and makes a Penetration into the Cavity of the Bladder,

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where it pours in the renal Urine by a safe Journey, being hindred by its own Structure or Make, from rising back from the hollow of the Bladder into the Ureters, howsoever it be compress'd or squeez'd.

Microscopes, Injections, Ligatures, comparative Anatomy in Hedgehogs, Mice, testaceous Fish, Bears, Oxen, Birds, Human Fætus's, the Dissection of Dead Bodies, subject to Diseases of the Reins, monstrous Kidneys, all these teach us this is their Condition.

From whence a mechanical Secretion of Urine is understood to be made by the Force of the adjacent Heart, and the Strength of the Arteries, by which the aqueous Blood is push'd forwards thro' innumerable Windings and Turnings, opposite Motions, Concussions, &c. and last of all, its liquider Part is secern'd, propell'd and ejected by much straiter or narrower Pipes, than those of the sanguiferous Vessels.

Therefore here is no feigning of Attraction, Emulfion or the like Faculties, neither will there be any need of a foreign or intestine Fermentation; for here is neither Place, nor Cause, nor Time, nor Matter, nor Mixture, nor Essect; neither ought we further, for the same reasons to imagine any Virtue or Function of pouring out, or precipitating the Liquor, but that it slows naturally or of its own accord, according to the Size, Structure or Strength of the renal Vessels.

The Action of the Urinary Bladder.

In the Pelvis, beneath the over-stretch'd Lamella of the Peritonaum, adheres the Urinary Bladder, saith Vesalius, securely defended, consisting of three different Membranes, to wit, of an external one

from the Peritonaum, a middle one made up of various muscular Fibres, and an internal Membrane, faith Graef, form'd of mucous Glands, which hinders the Erosion of the acrid Urine that may lodge thereon. Therefore when the Urine corrodes, diftends or irritates by its Acrimony, Quantity or long Residence upon the Part, a trouble some Sense of Painarises from the deters'd Mucus, or Slime being worn off, by which means the Motion is excited; from whence all the Abdominal Contents are driven with great Force into the Membrane extended over the Pelvis, hence into the Bladder, and fince nothing refifts at that time, the Urine is driven beneath with great Force into the Aperture, at the Neck of the Bladder, extending it, and preffing the Vessels placed around it, it raises the orbicular Sphincter, which, according to Fallopius, sticks in the upper Part of the Neck above the Proftata, under the right external Fibres, with their transverse carnous ones that are not very thick; from whence, by the same Force, de Graef afferts, the Urine is driven into the hollow Pipe of the Urethra; and then by the flaccid Urethra, from hence, out of the Body.

As foon as that Action ceases, the Fibres pressing no further, contract themselves by the proper Strength of the Sphincter, and so firmly that the Bladder: So the Muscles in Men, expressing and agitating the Urine, expel the Remainder thereof: For fince thefe, faith Cowper, arise from the upper external Part of the Urethra under the Os Pubis, and bind or surround extrinsecally part of the same Urethra, united on the lower fide, and so proceeding to the Peritonaum, and there ascending separately, are inserted on both fides to the Corpora cavernofa of the Penis: This Action of those is easily understood, for being lost in old Age, there is a troublesome Stillicidium or Pissing

drop by drop attends that Evacuation.

But the Urine is of many kinds, as we may diflinguish at first before we say any thing of its Nature; for from a copious aqueous Drink, is made a crude, plentiful, soft, insipid Water, without Smell. and which may be easily kept or retain'd in the Body.

But that which is render'd from the Chyle already made, is more concocted and less in quantity, acrid, falt, smelling a little, and more irritating; that again, which from Chyle is made into ferum, is redder, more digested, much less salter, færid, acrid, and more stimulating, and consequently cannot be long retain'd.

But that at length, which ariseth after a continual Abstinence, by the strong and daily Attrition of the Humours, as also from the detersed solid Parts, is at last very little in Quantity, very sharp, salt, fætid and red, being scarce able to be held at all, and

approaches next to Corruption.

Therefore the Urine is form'd of that watery Part of the Blood, which contains the sharpest, subtilest and most volatile Salt, next to an Alcaline; the most acrid, thin, volatile Oil, and a fine, volatile, impalpable or subtil ground Earth.

Yet in the Water of Urine, there is a fubtil, fœtid, strong stinking Oil so attenuated, that it is capable of being intimately mix'd with Water, but is

difficultly separated.

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The Native Soap like Salt, that is analogous to that of Sal Armoniac, yet that is different from it, but there is a fix'd Salt first of all present in Urine, that is taken from a Marine Salt; therefore an urinous Salt is not acid, or Alcaline, or Armoniac, or Muriatic, but is endowed with a peculiar Disposition or Nature proper to it felf.

The Oil of Urine, attenuated from the Attrition or Grinding of Fat, seems to be one simple Body, different from all others; tho' by the Mixture of

Salt

Salt and Earth in it, it seems first of all to be of a

various and manifold Nature.

Lastly, The Earth thereof is so thin or fine, and appears so intermixed with the rest, that hiding it self amongst the first, it is plainly undiscoverable, but separated from them, it is simple without Smell, undissolvable, white and fix'd.

Neither is there any Nutritive, wrought ferum, or good Chyle, or Milk ever to be found; and whence is that hinder'd, but either by the Groffness or Fineness of those Fluids, and the Windings and Tur-

nings of the Uriniferous Canals.

Neither is ever that necessary or requisite in Health, that is thicker or grosser in the Blood; its serum Chyle or Milk. Hence Diuretick Waters, especially those mix'd with Salts; but before all, if they are drank cold: Fermenting Liquors are less Diuretick, and those which are oily or fatty least of all; but

Acid Wines pass quick by Urine.

Hence we know how to answer these Things, from whence comes the Quantity, Colour, Smell, Taste, Thickness, and Contents of Urine, as what swims at top and what subsides? Namely from the great Variety of different Waters, Spirit, Oil, Salt and Earth, entering into the Mixture of the Urine. Therefore whether the Separation of it thro' the Kidneys, be necessary to the Preservation of Health, or it can be supply'd from other substituted Excretions, we have an Answer.

Therefore since the Motion of the Humours, the Fabrick of the Body, Ligatures, Injections, Autopsy, Diseases, arising from the Interception of Urine, teach us clearly how commodiously it issues from the Blood by these Passages only: Therefore what need is there of seigning or imagining in the Stomach and Intestines, Passages or Holes from their Cavities, that send forth an Humour or Liquor into the Cavity of the Periton cum? From thence again

in the Membrane extended over the Pelvis, and wound about the Bladder, as also in the Body of the Bladder, that there are such like Pores every where, which absorbing an Humour from the hollow of the Peritonæum, directly convey it into the hollow of the Bladder? Again, there is no Remora or Obstacle that resists that inward Propulsion, but a ready and most expeditious Round. Last of all, what need we seign Phanomena, when indeed there are none to be observed that enforce it, no Arguments that can prove it.

But if we enquire whether it is probable, that the Kidneys contribute any thing to the Semen, and what that is? Undoubtedly the Situation of the Emulgent and Spermatick Artery, will inform us fomething of that; and why Stones and Gravel so frequently

proceed from the Urine?

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The Action of the Muscles.

Fter feeing what is done with the Blood, agitated or mov'd thro' the Viscera, it will be more easie to understand the Inquiry into that, which is driven by the Muscles into every Part of the Body, and from thence into that which is moved in the Integuments, encompassing the external Superficies of the Body or the internal Cavity.

But there is scarce elsewhere, any greater Obscurity in the minutest Vessels and Instruments, that essels the highest Diversity of Opinions, and also

the Difficulty of the best Choice.

For the solid Parts of the human Body are either moved by the Agitation of the Humour, that flows thro' them with force; or they are moved by the Help and Affishance of the Muscle, that is fasten'd or bound to them; but that being disunited, cut asunder.

asunder, or corrupted, this latter Motion ceaseth; but this Motion is voluntary, spontaneous or mixed.

All Muscles act or move, when render'd shorter, contracting or drawing together their annex'd Solids, or they compress, or else expell their Humours by Compression. Wherefore all the Difficulty lies in this, that the Fabrick or Structure of a Muscle be assign'd, and its contracting Cause, whereof one

certainly much depends on the other.

Every simple Muscle yet known, saith Lower de corde, consists one way of a carneous or steshy Belly and one Tendon, which may be again divided into others very like them, but always less; and those again which arise or spring from these into lesser ones are always like the largest; and indeed this Division proceeds so far, that at length they vanish into such an incredible Fineness, saith Leeuwenboeck, that they exceed all the Strength of Imagination; but Reason determines them so far, as at last to bring them to a point or end; and that very Extremity is so like to an entire Muscle, that it hath its Belly and Tendon as evident as the biggest; but is call'd a Muscular Fibre, the Conjunction or Unions of which may properly be called a Muscle.

From these Things it is evident, that these Fibres are not Arterial, Venous or Lymphatick Vessels; but of another Nature, and the Organs much less than these, whether vesicular, or made by one Tract

or Continuation.

Since therefore it is suppos'd the Nerves enter into every Muscle, together with its Arteries and Veins; from thence they are distributed, being deposited there by an external Case or Covering, thro' every Muscular Body, that there cannot be a Point assigned in which Part of them are not to be found; then that all the Nerves disappear, or are not to be seen here; that in other Parts of the Body the Extremities of the Nerves pass as it were into explicite Nerves;

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Nerves; from whence it is concluded that these Fibres having from the reason of the Thing, the Nature of a Nerve, from the Extremity thereof stript of its Covering, admit of the finest Expansion within the Cavity, of the Figure of a Muscle sull of Spirits, which is bestowed from that Nerve, that springs from the Cerebrum and Cerebellum, continually by the Impulse of the Heart.

From these Fibres united together, are made Fasciculi or Bundles, which again have a singular Membrane, in which they are involv'd, and separated distinct from others, but that is as far as the Sense penetrates. This fine Membrane is cellulous, within full of Oil, which is bestow'd upon the Increase of such Animals as are at rest, serving to defend, anoint and lubricate the Fibres, supply'd from the Arteries, as an Injection of Mercury informs us.

But the Artery agreeable to Ruysch, is brought to the Muscles, which is discover'd in the same Place, in that Size and Contexture, that the unwary would judge the whole Body of the Muscle scarcely blown up from this alone. These first of all are distributed amongst the Fasciculi, and in the Membrane distinguishing them, and perhaps in the external Superficies of some one Fibril; where they end in reticular Plexus's, oleous Secretories, the smallest Lymphaticks saith Nuck, and sometimes into hollow Fibrils, like Nerves; which Fibrils also may end either in the Cavities of a nervous muscular Fibre, or else themselves make such like.

At last it is plain that every Branch from the Arz teries in the Muscle, hath a Vein answering to it self, which united to another makes a larger; from whence the sanguiserous Veins of the Muscles and the Lymphaticks are made.

But the Tendon of a Muscle duly examined, is divided into so many Fibrils, as the Muscle it self, for this reason, that the Cavity of the Muscular

Fibre becoming thinner, from its obtuse Amplitude growing into one acute Body, is made stronger, harder, dryer and narrower, being almost destitute of Vessels; from the compact Union of which the whole Tendon is made, hence call'd by the best Name Aponeurosis; tho' from another Opinion, from two such Muscles connected by an opposite or contrary Situation, saith Lower almost all the visible Muscles are made.

Therefore the Redness of every Muscle changes its Colour from the Blood by which it is wash'd; but the Substance first of all depends on the Repletion of the Arteries, Veins, oleous Cells, and Lymphaticks: Hence it becomes diminished in old Age, Leanness, Atrophia, continual Sweatings or Colliquations; and yet Motion remains in all these, Insects also teach us, they can exercise or perform Motion, tho' not with red Muscles, because in them there appears no Flesh to the Eye.

Fibres, Fasciculi, Arteries and a Nerve, in Life and Death are drawn asunder, or divisible without breaking; and the they are tense, they are endowed with a contractile force, being cut, they shorten much, and then lessen in Substance, contracting themselves as it were into an undulating Superficies, expelling their proper Juices; hence they are always and every where in a violent State, they always endeavour Resistance in their Elongation, and labour to shorten themselves more in Life, and less in Death,

therefore require an Antagonist.

Being strongly comprets'd, evidently contus'd, totally obstructed, separated or cut off from the Cerebrum, the voluntary Action of all the Muscles, all Sense and Memory ceases; but the spontaneous Action of the Muscles remains in the Heart, Respiration, the Viscera, and Vital Part, from a free, open, and found Brain. The same Things being done in the Cerebellum, the Action of the Heart, Respiration and Life it self presently ceases, and the voluntary Spring together with every Sense, but Motion may continue yet longer, being as it were vermicular, in the Stomach, Intestines, and ending there yet may be restored.

By the Compression, Ligature, Corruption or cutting off the Nervous Muscle, all vital and voluntary Motion perisheth intirely in it; and if the Nervous Trunk thus suffers, whose Branches are given or distributed to various Muscles, the same thing

happens to them all.

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From the Performance of the same Facts in any Part of the Medulla Spinalis, the Action of all the Muscles perish, whose Nerves under the Place affected, spring from the Medulla; and so the contrary; the same Experiment in the Artery, distributed to

one or more Muscles, answers the same Test.

The Tendon of an acting Muscle saith Lower, is scarce alter'd to your Sense, the Flesh is shortned, hardens, changes colour, swells, bunches out, the Tendons approach each other by turns; the Part annex'd with the Tendons is lead toward that, which being less moveable is knit to the Tendon: This Action is call'd the Contraction of a Muscle.

In the same Tendon of a Muscle not in Action, the Flesh is longer, softer, redder, slat and subsiding; this State or Condition is call'd the Restitution of the Muscle, altho' it is almost done by the Strength of the Antagonist; for from that weight made, the Contraction remains spontaneously in the other, not from the equilibrated but prevailing force or spring of this.

One Antagonist, acting and the other not, is as the bending of a Joint or Limb, but if both move together it remains motionless; if neither act 'tis indifferent, as it is moved by that, whereby the least Excess of either leads, whether made by Addition or Substraction.

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But these Changes are made by turns in the minutest moment of time, and throughout the whole stelly Part of the entire Muscle, and therefore may be absent or present reciprocally, yet leave no Tracings or Footsteps thereof in the Body.

Any warm Liquid being injected into the Artery of a Muscle, that is not in Action, tho' of a dead Person, makes or raises the Contraction thereof; notwithstanding this be tryed sometime after Death.

The Substance of a contracted Muscle appears rather encreased, than lessen'd in every Experiment.

By the external force of a bent Joynt, tho' by the Endeavours of the Will, the bending Muscle alter the acting State in the very Flexure of this Contraction; and if it had been agitated by a proper Motion, yet it had been scarce so powerful.

Nothing being determined from the Will, all the voluntary Motions are equally fill'd and mov'd in all their Vessels, from the Blood and Spirits, being equally moved by them, and that together thro'

the whole Body.

From which certain explor'd Phænomena, the Properties of the latent Cause are evident, and the Muscles of the moving Cause, to wit,

First, It may be absent and present in the Muscle. And therefore Secondly, To enter in and go out thereof.

Thirdly, To be derived otherways into that, otherways out of it.

Fourthly, And that in a twinkling, or rather the

very moment of the Will's Efficacy.

Fifthly, And in the very moment of time, in which the Muscle is contracted, internally to push forwards, to every point of the Superficies of the Muscular

Muscular Villus, or hairy Nap of the Skin, as also into the contrary Parts.

That is Sixthly, It ought to be equally distribu-

ted together, thro' all the Flesh of the Muscle.

Seventhly, Therefore to dilate and fill the Membranes of the Fibres; change them from an oblong Figure into a rounder, increase the lesser Diameter, and lessen the greater, and to apply the Tendons alternately to each other.

Eighthly, Lastly, It ought to arise from the Cerebrum, the Cerebellum, and the Origin of the Nerves, and may overcome those Resistances, which seem

here sufficiently forcible.

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Ninthly, To conclude therefore, the most stuid, subtilest, swiftest Body is required, being apply'd

with Strength or Energy in the Muscle.

Which requisites, are to be found in the nervous Liquor and in nothing else; and therefore this must be own'd or acknowledg'd for a real Cause; neither

is its Action difficult to be understood.

For it must be granted or laid down as a Fundamental, that the Spirits slow swifter, from whatever Cause they proceed, from the first Origin of one Nerve, than by the rest; that more run or enter into a Fibre open to this Nerve, and therefore that this will be more dilated; will send forth the strength of its Spring at the same time, be passive and active; and the same Cause continuing much more will happen, therefore it will grow wholly turgid in the shortest, and the same Determination remaining, will last contracted; which as long as it happens in infinite Fibrils together, as to Sense, the whole Muscle is in the same Condition.

It necessary follows from this Celerity encreased in one Nerve, the others are moved much less, and therefore these being relaxed, perform the Encrease with more Excess of Strength in the Contra-

ction.

From which two Causes, all the Fibres swelling from the great force of the Muscle, bind close the Intervals placed betwixt them, and the Blood Vessels leated there; from whence the Veins are evacuated, the Arteries compress or squeeze the thicker Parts, that is, they repel the red Blood, and from the subtil force of the Heart and its own, drive them into the minutest Canals; and so from the expulsed Blood, we see the whole Body of the Muscle moved, by the subtil Humour running together, thro' the Nerves and Arteries; which is manifest to every Body's Satisfaction: For that is drawn, which is affixed to the prolonged Tendon, if so be it resists less the contractile force, howfoever with the least Excess.

But this Cause ceasing, the Elasticity of the Fibres, the equal force of others, the circumposited Parts acted beyond their Tone, from that contracted Muscle, restore together an Aquilibrium in all Parts. Therefore in every Phanomenon, and every Requisite, this is made plain, from understanding the Structure and its Cause, here plainly present in the Body: But only an assumed Power in the Origin of the Nerve encreases its Celerity; that being common to every Hypothesis, neither can this be explain'd.

Therefore Galen's incorporeal Faculty inflating the Nerves, is of no Service; nor the nitrous Spirit of the Nerve mixed with the Oil of the Blood accended and rarefied; much less the Acid Spirit of the Nerves, with the Alcaline of the Blood, or the Ebullition of the Air and the Arterial Juice; or the attractile Strength increasing amongst the smallest Particles of the Humours: For these Things are repugnant to the Phænomena of the Organs of Sense, of Matter, Mixture, Proportion and Duration, nay, there is no necessity for them at all.

But that Influx happening equally into all the Muscles of the Body together; cannot at the same

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time flow into the Heart being contracted, but must be thrown into its Nerves; from whence this, impleted by the Auricles, the Vena Cava, and the Pulmonary in its Cavities, by the Coronary Arteries in the Substance of the Heart, and by the Nerves in their Muscular Villa, in a moment is violently contracted; afterwards relaxing, is fill'd again, and so

alternately is always in Action and at Reft.

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But how much or great this Muscular Force is, he only understands that knows, 1st, The Place where the contracting Tendon is inferted to the contracting Part, as to distance from the immoveable Centre, about which the Flexure is made. 2ly, the Obliquity of Direction by determinate Angles, which are here frequently very acute. 3ly, The Weight of the very Part moved. 4ly, The Weight of the Body hanging to and raised up, together with the Place in which it is apply'd. 5ly, The Duplication required to the utmost of their Strength, that a drawing might be made towards a fix'd point; which the incomparable Borellus hath demonstrated from Mechanicks.

But how fuch a Spring or Force can be given to the Muscles by the Nerves; Mariet hath explain'd to us, in his Hydraulick and Hydrostatick Engines; and that the Strength of the Muscle is directed with wonderful mechanical Helps, which are: 1st, Membranous Shreads or Bands, largely expanded, furrounding the Muscles and subjected Tendons, and coercing or binding them close, as at the Carpus and at the Feet. 2ly, Broad Muscular Bands, such as are in the Arms, Back and Thigh, faith Vefalius. 3ly, Or according to Cowper, that are in the cartilaginous Trochlea, as in that of the Eye, or in the offeous ones, as in the Pterygoft aphilinus. 4ly, In another transmitting and directing Muscle, as faith Cafferins, is in the Stylocerate-byoideus. 5ly, The Tendons of the Muscles, suffaining, elevating and directing

recting or guiding the Hypomochlea; as the Patella, faith Vefalius in the Knee, the Sefamoide Bones at the Articulations of the Fingers, with the Appendixes annexed to the Bones, as the Trochanters are in the Os Femoris, according to the same Author, with the Circumduction of the Muscles themselves about the Bones, as the Marsupialis, as Spigelius calls it, or the internal Obturator.

But the contracting Force of the Muscles is encreased, much more as the Muscles are compos'd of many smaller Muscles, all which by uniting their Tendons into one, agree to make its Strength much greater; as for Example in the Deltoides of Lower, the Pectoral Muscle and Biceps humeri of Vesalius, the Triceps Femoris of Spigelius; for as there are many Fibres, the Muscle is stronger; as the Fibres are longer, they are so much the sitter for a greater Flexure.

The fingular Action of every Muscle is easily known, if the Connexion and Direction thereof be known, and the appointed Motion of the Parts, with which the Tendons are united.

Therefore the voluntary Muscles have Nerves, deriving themselves last of all from the Cerebrum.

But those which serve for spontaneous and vital Motions receive their Nerves from the Cerebellum.

A Motion remaining in the Fibres after Death, is from a spontaneous Contraction, or drawing together of the Vessels and Fibres.

But a Contraction of a Muscle, does not by any means proceed from a spontaneous Contraction, or a Contraction of a Nerve.

Tho' the Nervous Juice acts strongly on a Muscle, yet it injures not the Nervous Pipe; as from Hydraulicks may be seen.

A Muscle too long and powerfully stretched, grows painful, and is inslamed, the Reason is shown

in the Example of the Tetanus, which is a Rigour

or Distention of the Nerves.

The Muscles being alternately moved and relaxed, the Blood is reciprocally express'd and admitted with great violence, by which means it may often and in every Part, be attenuated, dissolved and ground, as in the Lungs, &c.

And this agile Effect is best understood, by comparing the Difference betwixt Exercise and a chearful Way of living, with that of a melancholy and

sedentary Life.

In too much Idleness, the Oil collected in sound healthful Bodies, compresses the Vessels, and closes the Fibres

An Animal exercising the Motion of the Muscles too much, grows lean, as Horses and other Beasts.

Age and a laborious Life, changes almost all the Muscles into Tendons, and those into Cartilages and Bones.

The Function or Office of the Skin.

Here is a cellulous Membrane saith Malpighius, fpread over all the Muscles under the Skin, which is furnish'd with Arteries, Veins, Nerves, Lymphaticks, and oily Cells, very dilatable, and which is able to grow out to any Dimension, encreasing from Fat that stagnates in round Cells, tho it is fine and oily; this being secreted by a slow Motion into additional Bags, serves for defending, lubricating and unctuating the Muscles; and may be of use to temper the Acrimony, and put a check to the violent Motion of the Blood.

Near to this Bed of Fat lies a thick Congeries or Heap of Nerves under the Skin, wrought into the Form as it were of a Membrane, render'd tough and gross from the hard Integuments of the Nerves,

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and every where compos'd of Arteries, Veins, and lymphatick Veffels; from whence several other

Things incumbent thereon shew themselves.

But for those Nerves, arising from that Texture, they form Pyramides, which depositing an exterior Covering bestowed from the Dura Mater, by those Exuviæ or little Skins, they compose a reticular or net work Body, discover'd first of all by Malpighius, in the Feet, Hands and Tongue, but shown more elegantly by the famous Ruysch; which being pierced thro' by as many Foramina or Holes, as there are Papillæ or Nipples arise, it transmits those soft nervous Pipes or Conduits throughout the whole.

From those nervous interwoven Stamina, at certain Places there spring up fine acute or sharp Bodies, call'd Hairs faith Malpighius; of which others from the very Glands of Fat seated betwixt, rise deeper, and being propuls'd from beneath, dry in the Air ferving for a Defence to the Skin, and to

close the Pores

But there are innumerable Branches from the Arteries under the Skin, that being dispers'd and interwoven, fend forth subtil, fine Vessels, which opening outwardly, emit in Health, a thin, volatile, odorous, salt, invisible Vapour, perspiring under the Epidermis; but these Pipes being more relaxed, or the Humours more agitated, it issues in form of Sweat.

But the subcutaneous Veins made by the like Apparatus, opening their small Vessels outwardly, ending in them, exhaling nothing, receive extrinfically the Liquors infinuated into them, and first mix Lympha, and then Blood, as many and certain Experiments teach us

But there are in the external Skin Meatus's or Paffages that are large, perpendicular, deep and cylindriack, in which internally on all fides, the exhaling Mouths protrude their Fluids, which being there

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collected, stagnating and drying, they pass into a vermicular Paste, that growing black in the Air, is oftentimes the Cause of many cutaneous Diseases.

Upon this saith Ruysch, lies the Epidermis, or Scarf Skin, entirely separable from that underneath; divisible into many Lamellæ or Scales, consisting of no Vessels, that can be made visible by any Art; endowed with no Sense, being wholly squammous or rough, so that it is incredible, saith Leeuwenhoeck, to see the small Scales, cut into various Figures, the Furrows, Holes, &c. that are in it agreeable to Malpighius, and which are chiefly to be seen at the spiral Tops of the Fingers: In the middle of these Furrows the sudoriferous Vessels lie securely, but on each Parallel side of the Furrow, a Series of nerveous Papillæ, from whence it is manifest, the sweating Vessels and those of Perspiration, the Papillæ of seeling, &c. are defended by this slender Covering.

The Excretion of Sweat.

Nder the Skin it self upon the Fat, throughout the whole Circumference of the Body, are seated the milliary Glands, closely united and compos'd, or made up of an Artery Vein and Nerve, forming an emunctory Vessel, that arises by a Foramen in a reticular Body, that spues out Sweat by an open Orifice under the Epidermis; and is cover'd with a hollow Valve, rais'd up and round, that is, posited under the Cuticula, powerfully to transmit and coerce the Humour; this is the Principle Organ of Sweat, to which from thence, other Vessels of Ruysch's Discovery are added.

The Sweat thus secreted, is different according to the Difference of Air, Climate, Sex, Age,

Diet, &c. as hath been said of Urine.

In a healthful State there is scarce any, except from an Error of the Six Non Naturals; In its first Effect; it is always noxious or hurtful; by Accident sometimes it is profitable.

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The Perspiration of Sanctorius.

Here are besides, exhaling or perspiring Vessels, under the Squamula or Scales of the Epidermis, that lie obliquely open, but are of that fubril Smallness, that there are computed 12,000 Apertures in the Compass of one common Grain of Sand, according to Leeuwenboeck: From these a subtil Humour perpetually perspires from every single Point of the Body, call'd after the first Inventors Name Sanctorius's Perspiration, to which Invention and the Persection thereof, the Glory of this Opinion is owing.

This Exhalation is made throughout all the external Epidermis, as also in the Cuticula of the Mouth, Nose, Jaws, Laryna, Lungs, Gullet, Stomach, Intestines, Bladder and Womb; from whence the Quantity thereof exceeds the aggregate or collected Faces of all the other Excretions; for in the Air of Italy, in a vigorous State of Life, and moderate Diet, it equals five eights, of what soever is eat or drank.

The utmost Fineness, a regular Equality, great Plenty, together with the Lightness to the Sense, and adding Weight or Encrease to the Stature; Augmentation after Sleep, demonstrates the Body to be perfectly in Health; and is a special Help to the preserving it lo.

But a Recess of Perspiration from these, is almost a certain, and the first Messenger of an approaching

Disease, nay, perhaps the Cause of it.

The Viscera, Vessels and Fibres being strong, effect, preserve, augment and restore this Retreat of Perspiration: Exercise of the Body at the very BeginBeginning of a light Sweat, a moderate Use of Venery from the Strength of Constitution: Seven or Eight Hours Sleep with the Body well cover'd, but not with too great a Weight of Cloaths, Chearfulness, Youth, solid, light fermenting Food, not too fat, but a little season'd, a pure serene, dry, heavy, cold Air.

But all things that are contrary to these, as well as all the other Secretions, being more increased,

lessen, impede and deprave this.

Hence it is plain to us, what this perspirable Matter is, its Cause, Effect, Necessity and Use, that is past repairing in the first place, by reason of the Flexibility and Sostness of its Vessels; especially as the nervous humid Papillæ are apt to be affected from the Objects, and by transmitting the impress'd Effects of those, they are ready for such Actions and so continue.

And so it is understood from the Encrease of Sweat, and the Enlarging of its Vessels, that Perspiration must necessarily be diminish'd, and the Vessels thereof compress'd.

In like manner, by violent Motion and too much Heat, this perspirable Matter is converted into

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ry inBut it is greatly affifted from moderate Motion, and Warmth.

But nothing hastens it, or conduces more towards it, than gentle Frictions or Rubbing, and that continued for some time together; but constant Sweats and such as are great, relaxe, debilitate or weaken extremely, and that always and necessarily will happen to such as labour under, and often die of Weakness, Atrophies, Phthisacks and Syncope's.

But why prefently, and for some time after eating, is the Perspiration smallest in a healthful Man? and why the largest Perspiration betwixt the Fisch and the Twelsth Hour from Meals? for

which

which reason, Riding on Horse-back, Coach, &c. especially a brisk Motion on the Ice, or in Snow, chiefly promote that.

Of Nutrition, Encrease and Decrease of Sub-!tance.

Hat a human Body may exercise all those Motions of the Humours, Vessels and Muscles, and that none of them may in the interim be deflroy'd, there is required a ready Flexibility in the Veffels, Muscles and Fibres; to the obtaining of which, the Parts cohering or sticking together ought to be chang'd, partly from Contact, and partly to continue therein: Which cannot be done, except the great Parts be made up of the slenderest. thinnest and shortest; neither can this happen again, unless amongst these there constantly run a renovating Fluid or Humour that hinders concretion: therefore the whole Body, as it is flexible, ought necessarily to be made up of these small Vessels.

Yet in that very Motion, in the Vessels that are of a fine Structure, affiduoully and violently exercifed, as well by a perpetual Circumduction of the Humours as the muscular Actions, the smaller Parts are necessarily grounded or broken in Pieces from the Solids: The Parts thus exercised by grinding, are mix'd with the Fluids, are agitated and exhaled; in the mean time, the Fluids made less by continual Attrition, proceed to the perspiring Vessels, and vanish out of the Body, hence from that Condition,

a Live Body is foon destroy'd.

Therefore for Continuation or a Constancy of Life, there is need that there be so much, and of fuch a nature, perpetually restored to the Fluids and Solids, as was lost by those Motions: This

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is faid to nourish or sustain, and this Action to be

But the Humours being wasted, as to Matter, from Meat, Drink and Air, as to the requisite Functions thus far expended, on the concurring Strength of the Body, they are repair'd or recruited, and apply'd

to their proper Vessels.

The Nutrition of the folid Parts being something obscurer, is understood from the Knowledge of the following things. Every solid part of our Body, is form'd or made up of others much less Parts, how like soever to the greater: Vessels from Vessels: Bones from lesser Bones, and this Fabrick proceeds on, beyond all the Limits of Sense, by what Art soever assisted, as Malpighins, Ruysch, Leenwenboeck and Hook, have prov'd by accurate Experiments. Yet this Division seems almost to proceed to Infinity, as the Nature of the Aliment and Humours teach us.

Besides, the Microscope, Injections, small Wounds, blistering Medicines Wasting, Dryness inform us, that our Solids compar'd with the Fluids, are but very sew: But it is plainly demonstrable, from the Consideration of the Rise and Generation of the Vessels, and from the Resolution of the largest Vessels form'd into smaller, that the whole solid Mass of our intire Bodies absolutely consists, or is made up of nothing else but mere Nerves or Filaments, as their Elements or Principles.

And indeed all that Mass, being taken from an incredible small Particle, grows from those things, which before were so subtil, that they were but just a dissolving or sluxing Liquid, like to that of the nervous Juice; as we have taken notice already in that of the incubated Egg, observed by the curious

Malpighius.

For neither does the White of the Egg nourish at first, till being incubated, it hath passed by that Energy,

from the Thickness of its Humour, innumerable Degrees of Fluidity, thro' diverse Waters, at last terminating in that Subtilty; but then that Liquor, as yet bestowed on the *Embrio*, is thick, and is transmitted much finer in its Vessels and Viscera.

But from this subtil Humour, the first tender Solids arising, almost like Liquids, they pass again thro' infinite intermediate Degrees, till at last it is brought to the solid Parts, as Malpighius hath taught in Eggs, and the incomparable Ruysch hath discover'd and shewn in Embryo's and Fætus's; nay, he hath given us an accurate Enumeration of their various Parts. Wherefore it is hence evident, that the Solids in their first Rise from the Liquids whence they are derived, only differ in Rest, Cohesion and Figure.

Therefore such a Particle now fluid, will make the Part of a Solid, from thence formed, and Strength being added to it, effecting the Cohesion thereof with the other solid Parts, howsoever that

is performed.

Which Cohesion produced after the best manner in a Fibre already made, if the Place be large enough in the Solid that remains from the Particle of the Solid that is destroyed, and likewise in the Fluid, the Particle answering in Substance or Size, in Figure and Nature; and also the Strength or Impetus that intrudes that Particle into that place, or accommodates it there.

Therefore the Nutrition of the Solids is made in the smallest or minutest Vessels, from the greatest Conjunction of which they are made, that is, in the Nerves or Vessels most like to them; but since that cannot be done, except some Liquid be carried into these Vessels: Is it not plainer to you therefore, that the matter nearest or most agreeable for Nutrition, should be a subtil nervous Humour, most likely or probable for that Use?

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Don't you from hence believe, that Nutrition is perform'd from the last and most perfect Actions of Nature? and that it may be done well, it is likewise necessary, that the former Actions be so too. Therefore the Chyle may fill the Vessels, but it cannot recruit or supply the Solids; also in the Lungs, by the Strength of Respiration, the Chyle being attenuated, chang'd, subdued, mixed, and render'd sit to pass thro' the Vessels, is indeed a properer matter than before, but not yet aptly prepared for this Work of Nutrition.

From hence repeating the Operation or Effect of the Lungs, Viscera and Vessels, there is made a soft, tenacious, plastick Serum that is almost tasteless and without Smell, growing thick before the Fire, and also doing the same in Spirit of Wine, likest to the White of an Egg; and therefore such a Fluid, in which are all the Conditions, that are in that Humour, from whence we certainly are assured, from that single Experiment of an incubated Egg, how all the solid Parts of an Animal Body are daily made: Therefore, tho' happening again in a more proper degree, it is not yet made ready for Nutrition, much less red Blood; entring into the smaller Vessels, neither one nor the other.

But as the Heat of Incubation, so the Action of the Viscera and the Vessels, on the Serum thus agitated or moved about, introduces various Changes, till part of it goes into so subtil an Humour, as is here required, sit to repair the consumed Parts; and this is the true immediate nutritive matter.

Which how simple it is, tasteless, and without Smell, the Fire, Putrefaction and the Chymical Art teach; for they leave behind a mere light insipid Earth: Yet the last matter is not found to be fitly elaborated, unless with these degrees; but the very same Humour often more acrid from the too often repea-

ted Circulations, and being destitute of the more liquid Part, render'd sharp from its Oils and Salts, by that means it is return'd improper and unsit for Secretion. Hence there is a necessity of new Chyle, and consequently of Aliment and Drink, as requisite to this Nutrition.

The manner how, and the Cause from whence this is done, are understood from what follows. An Humour puls'd directly thro' a full Canal, conick or cylindrick, elastick or rigid; if it flows from a broad one into a narrower, or with some Resistance made against its Motion; it endeavors to make the Sides of its Canal, near the Axis of its Longitude: Which is done every where in the Body, except perhaps in the hollows of the Veins and their Receptacles.

But by this Labour, either conftantly by Repetition in a less degree, or by little and little insensibly, these Vessels are length'ned, and by their Elongation, more and more attenuated or spun out siner, and that in a short time. Hence the last Extremities of the Vessels, tho' very sine in us, cohering less together, that is, being next to a State of Dissolution, are perpetually affected: Therefore the extreme Ends of the Vessels are render'd so sine and ductile or yielding, that they scarce differ from Fluids.

Therefore while that Motion goes perpetually forward in a continued Propulsion, these Two are necessarily made, first of all, to wit, the last Particles of these sine Pipes being worn away, are carried again, as it were, into a kind of Humour or Fluid, lastly, in whatsoever Part of the Body they stick: From thence the smallest Particles, which compose the finest Fibrils by their Union, are so separated from each other mutually, that they leave empty Interstices in those Places, where they adhered before. But this is done every where, and

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But the same Humour, from whence these are made, contains abundance such like Particles as they were, which are thus separated or destroy'd; it conveys, mixes and applies them to those very Interstices, but with that Impetus, whereby it endeavors to ruin the Canals; from whence it forms, configurates and binds in intermediate Bodies in this Passage. So that they adhere and stick just like the former: Notwithstanding the Matter, Preparation, Application, Strength and Motion, continue always the same; therefore what is lost, is nicely restored. So that the Solids remain as they were, that is, they are perpetually nourish'd and preserv'd.

But that shews the inestable Wisdom of our Creator in this thing; that the same Cause which inevitably destroys, in like manner, can repair or make again the thing destroy'd by the same Work or manner of Operation; from whence also 'tis taken for granted, by how much greater the Consumption is, the larger is the Supply: Lastly, That those Parts, which are first of all wasted in the Action of the Body, are precisely, and that before the rest,

always the best recruited.

It is evident, those Vessels, which are most tender and delicate, and best adapted or nearest to the moving Cause, are for that reason most easy to be elongated, distended, wasted or repaired: Therefore our Bodies, by how much the nearer they approach to their first Original, from thence they increase and grow out the more.

In the mean time, while that Action goes forward, the larger Vessels become more extended by their Liquor, but the small ones at the same time, whose Contexture make the Membranes of the grea-

ted Circulations, and being destitute of the more liquid Part, render'd sharp from its Oils and Salts, by that means it is return'd improper and unsit for Secretion. Hence there is a necessity of new Chyle, and consequently of Aliment and Drink, as requisite to this Nutrition.

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ter, are render'd juiceless, being compress'd and growing together, from whence comes the Firmness of the Fibres, but the Loss or Destruction of its Vessel.

Likewise such as have been Vessels some time in the Body, are from hence observed to become mere hard Ligaments; that at length we may be persuaded, that the Vessels form a Co-alition, or Union from the concreted Humours by the same Ne-

ceffity.

Last of all, from the Concourse of these Causes, the Strength, Hardness, Rigidity and Thickness of the Solids proceed; therefore the Number of the Vessels is greatest in the Embryo, but as Age increases, they gradually decrease; contrariwise, from the same reason Weakness wears off, Strength grows up: Consequently, in Youth, the quantity and force of the Fluids exceed the Solids; in Age, the Solids in strength and number exceed the Fluids. From whence is understood the State of Increase and Decrease, the Manner, Cause, and different Appearance of Death in pure Old Age.

But he that confiders all this Hiftory, from hence those things which happen to the Body, and compares them together with that, will fee indeed that all these are perform'd thus; for the whole Cuticle in every Part is constantly scaled, perisheth, and is renewed again: The Hair, Nails, Teeth, being daily pared, cut, fil'd or the like, grow again: Those Parts that are carry'd away of the Vessels or Bones, by little and little are increased from every Part: The Sordes collected from the Extremities of the Vessels throughout the Body, by wasting or exhaling, beheld with Microscopes in perspiring or disfolving, and examin'd in Water, teach us these things are made from the Solids and Fluids, being prepared by washing, grinding, &c. and are like the former.

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From hence also is understood, that the growing Size of the Body, as to the Habit thereof, in brawny, sleshy, fat Persons, is not from the Increase of the Solids, but from those collected, stagnating, extensive Humours, that sill the larger Cavities; Hence to be fat, is to be subject to Weakness and Suffocation; and therefore how greatly ought a Physician to distinguish betwixt Repletion and Nutrition, since this last strengthens and confirms the Vessels, but the other weakens, relaxes and extends them.

But Reason, from these things shews, or makes it appear, why the Structure of our Solids is not dissolved by the Liquors contained in them? Also from whence it happens, that this Machine can so long subsist an active Body? What is the Cause, that in corrupted Nerves, the Nutrition of the Part perisheth that is endowed with that Nerve? and likewise why the same obtains in the Artery? why there is no Solids in the Embryo, sew in the Fatus, and very many in such as arrive to Age, nay in these, Nerves, Tendons, Arteries and Receptacles are made into Cartilages, and afterwards into Bones.

At length we may know how many forts there are, and also how often the Circulation of the Humours of our Body are perform'd? likewise of what kind and how various are the Effects of it? And again, how those Problems are to be solv'd, whereby the accurate time is sought, in which all the Humours together pass thro' the Heart? And also others of the like nature, which may seem easy to the hasty and unthinking, but are most difficult to such as examine with Deliberation, and appear

almost impossible to be resolved.

Order requires next that we treat of Sleep and Waking; but fince in them, there is always something to be said of Rest or Exercise, and of those things which relate to the internal or external Sen-

fes; the Order of things now leads me to an Enquiry into the external Senses, and first of common, universal simple Feeling.

Of Feeling.

dal Papilla, arising from under the hard, subcutaneous Nerves, from the naked exterior Membrane, hence are made truly sensible, being moisten'd continually by a subtil Liquor slowing thither, and defended by the thin Epidermis, from its pure Sensibility; they lie inclosed betwixt the Sinus's, and the little Holes or Cavities under the Cuticula, in Places most proper for exercising the Act of Touching, to wit, in the Tongue, at the very Ends of the Fingers in the Hands, and in the Feet; and this is the corporeal Organ, whereby these Bodies are said to touch or feel.

In which this is wonderful, that they are perpendicular in the remaining Superficies of the Body, but lie extended about the tops of the Fingers and Toes, according to the Length of the Fingers; hence, faith Malpighius, joining with the Epidermis, as in a Sheath or Vagina, being complicated and dry, they are harden'd in the Nails, rendring them fit for defending the Papilla, and hindring them

from becoming callous.

The Touch then is made, when the Tip or Extremity of the Finger is apply'd to the Subject, and the Papillæ are emitted from the Attention of the Mind, by gently rubbing upon the Superficies, so that some Motion is impres'd npon these Papillæ, the Effect of which spreading to the common Sensory, excites an Idea to the Mind, of Heat, Cold, Moisture, Dryness, Sostness, Hardness, Roughness, Motion, Rest, Distance, Titillation, Itching, Pain.

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of as Why else is there such Pain from the Sense of Feeling in the Epidermis, from bruising, scalding, burning, &c? Why the seeling lost from a thick, hard, callous Cicatrice in the Epidermis? What is the Cause of that wonderful Motion of trembling, and the Hands of such growing numb by degrees that touch the Cramp-sish? From such cruel Pain at the internal Superficies of the Nails, affixed to the Cutis, and at the Roots thereof? Why is the Sense of Feeling so acute there, where the cuticular Furrows are spiral?

Of Tasting.

N the back part of the Tongue, especially at the tip and fides thereof under the Skin, fay Malpighius and Ruysch, lie hid obtuse Papille, which in Tafting emerge from the live, warm, moist Tongue, but is gone in Death; but first of all distinguishable in Hunger: These Spring from a nervous Body, incumbent on the muscular Flesh of the Tongue, from whence they arise thro' the reticular permeable Body, as hath been already mention'd in the Cutis; then being fet with erect, little Sheaths of the exterior Membrane of the Tongue, they defend them against the Sharpness, Acrimony and Heat of the things taken into the Mouth; but these Vaginæ are porous, and so eminent or discoverable, that the fqueez'd Aliment how great soever, runs into them as they receive it.

And it will appear probable, that the Papille are very numerous, which arife, faith Willis, from the ninth Pair of Nerves, giving one to the Tongue, and which is distributed thro' it; but the Branch of the fifth Pair serves it for its muscular Motion,

as is made evident in another Place.

Bellinus proves from Experiments accurately made, that these Papilla make that Organ, in which the apply'd savoury Objects raise a Taste, but act nothing upon any other Parts of the Mouth, Tongue, Jaws and Palate.

That Matter in Vegetables and Animals, from which Art draws Salt and Oil, either Mix'd, or feparate, is the true Object of Taste, and therefore Salt, Soap, Oil and Spirit, is the same as that in

Foffils.

Taste then is excited, if the matter to be tasted, is attenuated, often dissolv'd in the Saliva, heated in the Mouth, apply'd by the Motion of the Mouth and Tongue, infinuated amongst the Pores of the membranous Vagina, penetrating to the Superficies of the Papilla lurking there, it affects and moves those, and so bringing the impress'd Motion to the common Sensory, it excites or raises in the Mind an Idea of Salt, acid, alcaline, sweet, vinous, spirituous, bitter, aromatick, hot, acrid, austere, or something else compounded from these.

Furthermore, the Cause readily shews it self, from which such a different Taste is rais'd from the same Subject, according to the difference of Age, Temperament, Disease, Sex or Custom of other

things first apply'd to the Palate.

But why should the most savory things be next to the most painful, as saline, aromatick and spirituous Bodies are, if apply'd to the naked Nerves or the Tongue, when excoriated?

Why do favory things foon reftore or make new again? Why are Water, Oil and Earth so insipid.

Of Smelling.

THE open Nostrils proceed from a wide Passage tending upwards into a narrower, and being double, double, are best sitted to attract and draw in the Air, applying the more volatile and odorous Parts to its Superficies; especially while they are closed together, being united by the Action of the Constringers of the Wings, or Risings on either side of the Nostrils; which, according to Comper, being carneous, are inserted from the foremost lower part of the sour Bones of the upper Maxilla to the

Wings of the Nostrils.

But the Capacity or Largeness of both the Nostrils, takes in that space into which the frontal Sinus's opens agreeable to the Descriptions of Palfin and Highmore; which are chiefly form'd betwixt the remote Lamina of the Os frontis, under the Eminence subject to the Eyebrow, and opening from thence a Foramen, that on the upper part communicates to the Cavities of the Nostrils, next the upper Bone of the Nose, they receive amongst them the mucous Membrane of the Nostrils, with which the whole interior Superficies of the Cavity of them, is encompass'd and cover'd; and in which the generated Mucus distills into the hollows of the Nostrils.

The great Caves of Highmore form'd in the upper Maxilla, opening themselves by a gaping Foramen into the Cavities of the Nostrils, also receive the same Membrane, saith Palsin, elaborating, collecting and excerning the Mucus therein. The little Cells, Cowper mentions, of the Os Cuneiforme under the upper spongy Bone of the Nose, that frequently by distinct Foramina, lying open to the Cavities of the Nostrils, receive the mucous Membrane of them, are cloath'd therewith, secen a Mucus, and emit or

fend it forth, by this very Passage.

There are besides that, that lie covered in this hollow of the Nose, being artificially dispos'd, four little Bones, call'd the spongy Bones of the Nose, there being two in each Nostril; the upper one, saith Palsin, is united forward to the upper Part of the K 2

maxillary Bone, where it is united to the Apaphysis of the Os frontis, at the internal Angle of the Eye; the other, saith Cowper, being the lower, is joyn'd in the lower Part of the Cavity of the Nose, to the maxillary Bone. These four little Bones are so wonderfully sabricated or wrought, from the sine offeous Lamellæ, being thinner than Paper, and so situated, that they have several little cavernous hollows, amongst which the mucous Membrane so infinuates it self, that it goes in and out, nicely investing the Superficies amongst the Lamellæ and leaves the hollow free: These Cavities of the small Bones and all the Cells, opening without any Restraint into the Cavities of the Nostrils.

The Nostrils are cloath'd with a thick soft Membrane, surnish'd with vast Numbers of little Arterial Vessels, as well as it is provided with round glandulous Bodies, and also sine small Vessels pouring out, or distilling a subtil Lympha. This Membrane insinuates it self into the Cavities of the six Sinus's, and the Cells of the sour spongy Bones, from whence by an admirable Institution, in that strait Cavity of the Nostrils, the Superficies of this expanded Membrane is much increas'd; so that one Part

scarce gives way to the other.

The olfactory Nerves, according to Ruysch, Vesalius and du Verney, proceeding without the Dura Mater, to the Os Ethmoides, apply their tender Fibrils to the little Foramina, that are found, says Palfin, in that Bone, which is penetrated with small Vaginulæ or Sheaths from the Dura Mater, by these the Fibres going out of the Os Cribriforme, are presently distributed throughout that whole large Superficies, and that very curiously into every Sinus and Cell.

From whence it is certain, that the Expansion of those Nerves is very broad, neither are there in any other Part of the Body Nerves so soft, and there-

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fore uncover'd, and consequently that can be so

easily affected or hurt as in this Place.

Hence from all that vast quantity of Glands in the same Membrane, and also of Arterial Vessels so plentifully distributed here in form of a Knot or Bundle, here is constantly prepared and excern'd a foft, fluid, inodorous Humour, that is almost tafteless and without Colour, which moistens, lubricates and defends the Nerves on all fides, and in every describ'd little Cell or Cavern; being always made quiescent, stagnate and inspissate; lastly, in whatever Part of the Body it is found flowing, it is call'd the Mucus: From the Effect of which that is perform'd, which would scarce otherwise happen; for those tender naked Nerves remain or continue good for a great Number of Years. Yet that this Liquor might not easily be chang'd into a crust or fandy Substance, by long stagnating and thickening too much amongst the Cavities, and so be render'd unfit to pass out thro' the narrow Ports of those Receptacles; there is a Branch of Willis's fifth Pair of Nerves distributed hither, that is, brought from its Union with a Nerve of the fixth Pair; irritated with which, the Intercostal and Vagus of Lower, and consequently the Nerves of the Muscles serving for Respiration are moved, from whence Sneezing being made from the Force of the Air, puls'd or driven by a violent Impetus, and rushing into these Caverns, the Mucus is absterged or cast off.

But that Part is the Object of Smelling in Animals, Vegetables and Fossils, which adheres in the Spirit, Oil, Salt and Savour thereof, if it can be so divided, as that it be able to sly and be spread abroad in the Air: But it is plain from the Number of Experiments, that that subtil Body which is call'd Spirit inherent in Oil, is that first Mover which excites the Smell; for this being separated from the odorous Bodies, the Residue is scarcely

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fragrant,

fragrant, but that being pour'd upon the rest recovers the Smell.

The Animal breathing thro' the Aspera Arteria or Windpipe, when it is cut in the Neck, and the Air passing thro' the Wound, perceiveth no Smell at all,

tho' from the strongest Scents.

When the Air is expell'd from the Lungs thro' the Nostrils in Expiration, there is Smelling, the odorous Subject placed without; likewise there is scarce any in holding the Breath; but the Smell is perform'd by drawing the Air thro' the Nose.

But the fironger any one draws, and the quicker he expells it reciprocally by turns, the better the

Action of Smelling is perform'd.

By Motion, Heat, Grinding, and the Mixture of different things, by a cautious Mixture of Salts to the oleous odorous Subjects, the Odour of the things

to be fmell'd is increas'd.

Therefore the Sense of Smelling is perform'd, while the odorous Effluvia contain'd in the Air, are strongly enough attracted or drawn thro' the Nostrils by the Motion of Respiration, and in that Figure are apply'd with Force to the olsactory Fibrils, from the Position of the little Bones united thereto, they act thus upon them, and communicating this Action to the common Sensory they excite the Smell of Acid, Alcali, Aromatick, Putresaction, Wine, sweet or sour, and so on.

Hence we may readily understand, how great an Affinity there is betwixt odorous and savory Things, or betwixt the Objects of tasting and smel-

ling.

Why do Odours oftentimes restore Life in a mo-

ment ?

From what Cause do they sometimes occasion Diseases, and Death it self; nay, almost all kind of Operations medicinal and poisonous?

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Wherefore in different Men does the same Smell produce such different and opposite Effects, from the same thing smell'd to?

How comes it to pass, that Animals who have the longest Beaks, or Bills, the largest spongy Bones,

shou'd yet enjoy the quickest Smell?

What is the Reason, why a fætid Exhalation from the putrefied Parts of Animals, or Vegetables, once impress'd on the Nostrils, shou'd stick or remain there so obstinately, and with such Trouble for so long a time?

The strongest Odours are they not apt to sneeze? What Use is there of the Humour and Mucus, daily generated and distributed thro' the Nostrils?

Why is a dull Smell quicken'd after fneezing?

Is that Humour ferviceable for purging the Brain?

And how far?

Whether is the Mucus when generated at first

thick? Or is it made so afterwards?

From whence comes fuch a great Communication of the interior Nose with the Muscles serving for Respiration, and the Abdominal Viscera?

Is not fneezing a Convulsion thence therefore, it wearies so, often creating Pain, and sometimes

Death?

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Of Seeing.

THE Ridge of Hair that is placed Arch-wise, on the rising Part of the Os Frontis, is call'd the Eye-brow; the erect, stiff Hairs that are born on the external Edge of the Eye-lids; springing from their little Bulbs, are call'd the Eye-lashes, which hinder small light floating Bodies from falling into the Eye, either from above, beneath, or sideways.

The Muscle call'd the Depressor of the Eye-brows, arises on either side, from the Bone of the Nose, where

where it is joyn'd to the anterior Apophysis of the Os frontis, and inserted in the finer Tendons under the elevated Part of the Eye-brow; making it a better Defence for the Eye to preserve it from Filth and Dust; and also a Shade to the Eye, being placed into bright a Light; whilst contracting the Supercilia, it draws it to the upper Eye-lid, and compels them mutually to come near or joyn each other; but the frontal Muscle saith Vesalius, elevates again the Su-

percilia where there is occasion.

Both the Eye-lids being membranous, thin, plyable and vasculous, are always moist in the internal Superficies, being furnish'd with a broad cartilaginous Arch, where they happen to be open or shut by turns, or removed by repeated Endeavours, they likewise defend and clear or purge the Eye: For the Elevator of the upper Eye-lid faith Fallopius, arifing from a narrow carneous Beginning, out of the very bottom of the offeous Orbit, going upon the ascending Muscle of the Eye, being dispers'd into the fine tendinous Fibrils, is inferted to the upper Part of the whole Tarsus of the Eye-lid; which moving elevates the upper Eye-lid without wrinkles, but the orbicular Muscle of Cowper and Bidloo, arifing from the larger Bone of the Nose, interspers'd with orbicular Fibres thro' each Eye-lid, by contracting it self like a Sphineter, and joyning by a moderate Motion to another, it presses the Bulb of the Eye with a stronger Contraction. But the lower Eye-lid is open'd by a spontaneous Contraction of Muscular Fibres, distributed in the Eye-lid, according to Bidloo.

But least the Eyelids continually winking, shou'd be exceriated by squeezing together, there are in the side or border of each of them, saith Valsalva, little granulated yellow Glands, that separate an Humour as it were from Far and Wax mix'd toge-

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ther, which serves to anoint and lubricate the Edges of the same.

The innominate Gland, as Bidloo describes it, being large, broad, compress'd, rough and conglomerate, is seated betwixt the Orbit, towards the external Angle of the Eye near the rough Chink, wrapt up in Fat, supply'd with Arteries, Veins, Nerves, Lymphaticks, and Hydro-opthalmick Ducts; making from the Arterial Blood a salt, watry, pellucid, soft Humour, always in some small Quantity, but in much greater upon rubbing the Eye, or from the Action of compressing the Orbicular; the Tears sall down betwixt the Bulb of the Eye, and the internal Superficies of the upper Eye-lid, moistening, lubricating and washing the Eye; being of use to hinder it from Concretion or sticking to the Eye-lids; and this abounding Humour is call'd Tears.

Certainly, each of these Humours being of one Figure, with absters'd Sordes and the determinate Concourse or Meeting together of the Edges of the Eye-lids; which being flut, leave a space, in the great Corner of the Eye for receiving these; which being form'd from a spongy Caruncle posited there, is determined into that space; there the groffer Part being fixed and gather'd into the Roughness of the faid Caruncle, it turns being dry'd into a gummy Substance, but the liquider Part, wonderfully pres'd by a determinate Motion into the dilated Foramina. feated in the extream Angle or Corner of each Eyelid, which are call'd the lachrymal Point; brought out from which, the lachrymal Canals run together along that Caruncle, into a lachrymal Bag placed in the Canal of the Nose saith Vefalius, which is made from the meeting together of the Os Unguis, and the Fore Bone of the upper Maxilla; from which by a Pipe that is always open, it is carryed into the Cavity of the Nose, immediately under the inferior spongy Bone: from whence the Cause is known why from Persons crying,

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crying, there is a Stillicidim thro' the Nose; and why in a healthful Constitution, all that Humour vanisheth.

So Eyes that are expos'd to the Air, are preserv'd moist, clean, pellucid, slippery, moveable, warm being quickly freed from all sharp or acrid Things as equally expanded from the distending Cause within.

The Structure of the Eye and the Action thereof, which depends on it, is best understood, if beginning from the optick Nerve, we contemplate it thence in that Order, to which all its other Parts and

Functions relate.

- From the utmost Region of the medullary Substance, saith Vieusfens, which produce the optick Nerves under the Corpora Striata of the Cerebrum, according to Willis tending forward, they are accurately united under the Infundibulum; afterwards going back again, they come to the round Foramina of the bony Orbits, impress'd on the bottom of the Eye, in all this Course being soft and porous, according to Ruysch, they are cloath'd with a single thin Membrane of the Cerebrum, made up of many Arterial Vessels, they run securely under the suspended Brain, in their Passage thro' these Foramina, being cover'd with the hard Meminges, they receive that as a Sheath strongly joyn'd to the former Tunicle, so penetrate themselves amongst the Cavities of the bony Orbits, and there the Dura Mater it self is feen water'd with many little Arteries.

These internal long Orbits, surrounded by the Periosteum, and fill'd with much Fat, receive the Bulb of the Eye, as it were like a Bolster, strengthning, defending, lubricating and affishing its Mo-

tion.

From thence that Vagina, or Sheath given from the Dura Mater, entring by the optick Nerve the Orbit upon the said Fat, by and by spreads it self almost into a perfect Globe, membranous and hard as it were like Leather,

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Leather covering the whole Eye, growing by degrees leaner, thinner on the Fore Part, pellucid and more prominent; it is call'd the bard or scelerotick where opace; but the Cornea, where thinner and pellucid, first of all serving to strengthen its Figure by its Supply of Vessels, and the sustaining Muscles and Tendons. For by this faith Ruysch, the Arteries and Nerves enter in.

But that Membrane which incloses the Optick, was from the Pia Mater entring into the Orbit, and encompassing the hollow Superficies of the Scelerotick, divisible into Two Lamella, endued with infinite distinct Arteries, from a different going according to Ruysch, it proceeds forward to the Place, where the Scelerotick makes the Cornea, where receding first of all inwardly from the Scelerotick, it gives a fine fubtil membrane, Covering the vitreous or glassy Humour, in the next Place, the Tunicle or Coat call'd the Uven, in the middle of which is the Pupilla, the contiguous Lamella and incumbent on the hard one is call'd the Choroeides, that which falls into this the Lamella Ruyschiana.

But while the Edge or Brim of the Choroeide running out, forms the Uvea, it also receives Nerves from those which are call'd to the Scelerotick, and perforating this and the Choroeide, communicated here to that, they are divided into many: From these and the Membrane, the exterior muscular Fibres of the Uvea are made tending from their rife towards the Centre, they end in an orbicular Rim or Border, confifting of muscular orbicular Fibres, which bound the Space and Figure of the Pupilla: This Rim being reflected backwards towards the interior Parts, binds the internal right Fibres of the Uvea in like manner, receiving it larger from the triple exterior one: From whence it appears the orbicular Constringe the Longitudinal, to dilate the Foramen of the Pupilla. But the little slender Mem-

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branes that are pellucid connecting the Fibres, are cover'd with the darkest Colour, where they regard

the back Part of the Eye.

Also in the same Place in the Uvea, is a wonder-ful Arterial Structure form'd into little Rings, and from thence sent into many spreading Branches: But before those Arteries from whence these are risen, in the Chorocide Tunicle, such like admirable Fabricks are opened: But the Contemplation of this eminent Apparatus teaches us, that there is made in the same Place the highest Attenuation of the most subtil Humour, and an easie Reduction of the grosser Portion.

In the mean while, from the same Place, the Circumference of the Chorocide rising out of that sine little Membrane, is also formed from the arched muscular Fibrils embracing the Gibbous, swelling the annular Superficies of the vitreous Humour, where it shews it self out of the tender Chrystalline; but the fix'd Beginning of these is in that Orb of its own rising, the moveable End in that Orb of the vitreous Humour, where it leaves the tender Chrystalline; the Distance of these is greater than that of those which is in the Uvea, which distance the black Colour sills; and also the Blood Vessels are found there after the same manner, as in the Uvea.

But the yielding vitreous Body is bound in with the rest, by the proper subtil little Membrane, joyn'd on every side with the thin slender Bands in the Cavity of the Chorceide, which is so fine that it scarce appears, especially by reason of its pellucid Nature; but by the Distillation of the Water falling from the vitreous Humour, it is found in this small Mem-

brane.

In the exterior Cavity of the middle Superficies of the vitreous Humour, the Chrystalline Lens refides unconstrain'd in its lower Superficies, being fastned thereto by the Assistance of the vitreous Membrane.

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Membrane, and also the Help of its own thin Membrane: But these little Membranes, and the Bodies bound or confin'd therein, are so pellucid and fine, that they are plainly transparent; yet Reason teaches us, they are made up of their smallest Vessels, and Ruyseb hath made them evident in the greatest of Animals the Whale.

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At length the medullary interior Part or Portion of the optick Nerve, enters into the bottom of the Bulb of the Eye; so that the Place of this Ingress by reason of its Altitude or Heighth is in the middle, but on Account of its Latitude it is so situated, that it scarce sticks in the third Part of distance from the internal Angle of the Eye, measuring the Diameter of the Eye breadthways. From whence the optick Axis does not fall in the Place of this Ingress, but recedes much from thence towards the exterior Angle. But this Medulla being enter'd in, by and by expands it felf in the bottom of the Bulb, rifing on every fide under the Vitreum, at the Ingress of the larger Arteries, stretching together with that, it is fill'd up and encompass'd; the Remainder that lodges there like a tender thin Mucus, is call'd the

Tunica retina. The Cavity of the Eye form'd from the hollow Cornea, and the Convex Superficies of the vitreous Chrystalline Body, is full of a thin, pellucid Humour, tafteless and void of Smell, presently growing up or filling again; and therefore is foon exhaled, extending and preferving the flaccid Cornea into an equal Convexity; sustaining the Uvea suspended, most liquid in Youth, by little and little growing more opace, thro' various degrees, often turning to white in Age; it seems to arise from the Arterial Blood, prepared in the Choroeide and the Arterial Rings of the Iris, and perfectly elaborated from the vitreous Humour; from whence being farther attenuated in the Arteries, from which the fmallest LymLymphaticks arise; afterwards transuding thro' their open Foramina on all sides, in the internal Supersicies of the Cornea, Iris, Uvea, vitreous Membrane, and the tender Chrystalline one into this Cavity; from thence it is perpetually reabsorpt by the open Mouths of the lymphatick Veins, without leaving any Faces at all behind; to which Work Nuck's Ducks and those of others are useless here; therefore it is most serviceable in this kind, for preserving, moistning and lubricating this tender Part, and continuing them in a pellucid State or Condition.

The solid Chrystalline Lens or Humour, being spherical on both sides, is form'd or compacted of innumerable spherical sibrous Segments, strictly united and pellucid, thicker or closer than the aqueous and vitreous Humour posited in that place, where the Axis of Sight passes the Centre thereof, and makes its Axis; nearer to the Cornea than the Retina, consisting of a vast Number of Vessels, as the Dryness, Loss of Weight, and Contraction of Body teach; this is improperly call'd the Chrystalline Humour; it seems to receive Vessels to it self, from other con-

tinued ones.

The vitreous Body also is most pellucid, and yielding, thicker than the aqueous Body; on every side Vascular, as the Humour slowing out of a Puncure and the Dryness thereof teach: Hence likewise it undoubtedly consists of a circulating Humour, of contracted crooked or bending Fibres, of a depressed Ring elevated in the middle, hence raised gently from the Chrystalline, brought to the Cornea made from the remoter Retina, restoring it self by the relaxed Fibres in that Ring, and subsiding in the middle, it performs its Function at the bottom of the Eye, the Chrystalline being slowly drawn to it.

The Eye being thus fabricated, and placed in its Orb, receives a Membrane from the Fore Part that is lax and moveable; arising from the Periosteum out of the external Circumference of the Orbit, which is a vaft vasculous pellucid Covering, for the whole Fore Part of the Eye, by which the Bulb thereof is

confirm'd in an easie natural Motion.

Then the four Muscles, Cowper mentions from Bidloo, arising carneous from the Circumference of the greater Foramen of the Orbit, ascending about the Bulb, growing tendinous about the middle, so fix'd into the Scelerotick, and being connate to that, they elevate and depress the Eye, bring it to and lead it from the Nose, they roul, compress and elongate, as fingle, or as they act in various Motions. From thence the superior oblique Muscle arising from the bottom of the Orbit, towards the Attollens with a carneous Beginning, furnish'd with a carneous Belly in its Progress, is chang'd into a round Tendon, which passes thro' a cartilaginous Pully, betwixt the anterior Parts of the Orbit, towards the Nose, from thence going back again, the Bulb is inferted in the middle Place betwixt the Attollens and the Ingress of the Optick; so makes it that the Bulb carryed round, towards the Nose, about its own Axis, may be led outward from the Orbit, and the Pupilla likewise may be turn'd downward. But the Inferior oblique Muscle being carneous from the exterior, in that inferior Part of the Orbit, which joyns here the Bones, arising betwixt the Abducens, and the optick Nerve inferted with its Tendon; makes it that the Bulb being turn'd round towards. the exterior Angle, to direct the Pupilla from thence, and also carried upwards, the whole Eye may be drawn beyond its Orbit: But if these two act together, they fet the Eye tuberant towards the exterior Parts from the Orbit, and render it fit to see into all the fallacious Objects that are near it on each fide:

fide: Laftly, by making use of the Motions of the four former Muscles, they make the Eye hang ea-

fily in the Orbit.

Furthermore, that the Modus and Place of Sight, or Vision, may be determined to this known Structure of the Eye, all those Things shou'd be apply'd which have been demonstrated in Opticks, Catoptricks, and Dioptricks, which have been so much improved by Sir Isaac Newton, who is a Man of so vast a Penetration, that he seems to have arrived to the utmost Persection of human Wit, in Mathematicks

and Philosophy.

Light, of all collected aggregate Colours, turn'd every way emits the most subtil Rays, but such as are compounded again, of all fort of Colours. hence being divisible again into simple ones; which by themselves or variously collected make various Colours, but all united together, ones splendid, lucid Brightness, or shining white Colour; these Rays of Light from the lucid point as the Centre, posited outwards towards all points, by right Lines, in a homogeneous Medium, without knowing any Interval of time, pass thro' and becoming pellucid, rush into opack Objects; and therefore arrive also at all points of the Cornea, which are continu'd within the Cone, which is made in the lucid point, as the Apex, in the plane of the Cornea, as the Basis, if shining between the Point and the Cornea, no Impediment interposes.

The same Rays approaching nearer to harder Bodies, being made curved from thence, some more, some less, are thus separated; being separated and reflected they produce various Colours, from a salse, reflecting or repelling Body, except that they are separated by its force; this various Reslexion therefore, according to the variety of Colour latent in the Radius, but yet in the Reslexion appears to be the same Angle of the reslexed and incident Ray,

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with the erect Perpendicular from the Place of Incidence, neither does there feem to be here made

any change of the rest.

But if those Rays fall in from one Medium to another, they are afterwards curved about the approaching ones, forasmuch as the like proceed by that Medium, from as much as the posterior Body is denser, the Rays are so much the greater towards the perpendicular, and so on the contrary; and also from a particular Cause latent here in some Fluids, tho not determined by Experiments themselves; and this Inclination is call'd Refraction.

But that is plain to the Senses from this certain Law; the same Radius, if it hath fallen on the same pellucid Medium by various Angles, will be as the Sinus of the Angle inclining mutually to it self, and so also the Sinus of the refracted An-

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Hence therefore the Rays, from the shining or reflecting point to the pellucid Cornea, are diminish'd or lessen'd by that means to the perpendicular, almost by the same Alteration of Course, as in the Water; so they proceed by the aqueous Humour, and are determined as they pass by the Foramen of the Pupilla, on the Superficies of the Chrystalline Humour, but those which enter in by such Obliquity, as they fall upon the Iris, from whence reflected they slip out of the Eye again, least being reflected and entring the Eye together, they shou'd confuse the Distinction of Sight. And there are others, which by their Obliquity flowing into the inferior Uvea and vitreous Body, or into the Superficies of the vitreous Body, are also so immediately suffocated in the black Colour there, as if there had been no Rays at all, so that no other can be transmitted thro' the vitreous Humour, except such as penetrating the Pupilla fall into the Chrystalline Humour: The Iris being in the mean time contracted or dilated, admits more or less Rays, according as the Object is livelier, or more languid, nearer or farther off: Whereby the luminous Object, constringing from thence the Pupilla, as the Object is nearer, the Pupilla is the more contracted, and so on the contrary wise, according to the former Description of this Machine, which defends the tender Retina, least it should be injur'd, dry'd up, or consumed with Heat.

The Cornea therefore as it hath a plainer Figure, compells the Rays as they pass from one lucid Point; and so spreads them the more about, from whence fewer of 'em reach the Chrystalline Humour, and those that do are much divided, except they come from a pretty remote Object; but as that is rounder, it more unites the Rays as they pass from one point, and by that means collects more of them in the Chrystalline Humour, from whence may be underflood one reason of the Sight of pore-blind and

old People.

The Chrystalline Humour collecting more determinate Rays, received from the Pupilla by a new Refraction, renders them converging, by which means, those that arise from one point out of the Eye being here again, collected into one point not very distant, may be pass'd thro' the Vitreum to the Retina, and there describing that one single point only precisely, from whence those Rays will follow; if the Chrystalline Lens is too thick or round, then the Point of Collection being too near the Humour, there happens a Consusion of Sight, if too lax or plain the remoter Point is stricken, from whence again proceeds Consusion: And this is another Reason of the short or distant Sightedness of such as are Pore-blind or Old.

Therefore why Pore-blinded Persons are affisted by a hollow dioptick Glass, or the Nearness of the Obiect?

ject? And why old People see better from a Convex Dioptick Glass or the Distance of the Object, is plain from what hath been said before? But these Vices are remedied, by the Adduction or bringing to of the Chrystalline Humour to the Cornea, or removing of it from thence, which seems to be done by two different Mediams: To wit, by compressing the Bulb of the Eye by the four Muscles contracted together, hence making it longer; or from the Contraction of the Fibres, compressing the Vitreum and raising the Chrystalline Humour; neither does there any

other Cause appear.

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Refraction from the Air upon the Cornea, is almost equal to that, which is made from a Ray of Air, let fall upon the Water, which from the Aqueous Humour upon the Lens appears equal to that, which happens to the Ray, acting upon the Vitreum from the Water, from whence it alters little: Laftly, that which is seen, while from the Chrystalline Humour on the vitreous Body it changes but in a small measure, and from the stricter Compression of the vitreous Humour perhaps scarce differs, till that Body is made thicker, from whence there feems to be at first, that Necessity of the vitreous Humour, that the Lens being able to be moved freely or without Constraint, it may fitly accommodate the Eye for various distances; while at the same time that very Mass of the Chrystalline Humour is more constant to its Figure, than the vitreous Body.

From whence the whole Apparatus produces this, that in the bottom of the Eye, directly under the Pupilla, there is made a distinct and lively Collection of those Rays, which proceeding on from one point of the Object, and entring into the Eye, penetrate the Chrystalline Humour, and so strike so many points on this bottom, as may be conspicuous in the Image, from whence the like little Images from

the Object are painted in the Retina.

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For fince the mucous Medulla of the optick Nerve, lodges precifely in this Place, directly under the Pupilla and the Chrystalline Humour, it is plain that is the Part, which receives the Pictures or Images, and brings them by a Continuation of this Imprefion to the common Sensory, and excites or raises an Idea of the thing seen to the Mind.

Hence according to the Experiments of Picard and Mariot; we ought to praise that infinite Wisdom, which hath placed the Ingress of the optick Sight, not in the Axis, neither towards the exterior Angle or corner of the Eye, but towards the Nose

in the middle Altitude.

Therefore the Perfection of Seeing depends on that Figure; the Pellucidness, Structure and Energy of the Solids, and on that Density or Thickness and Pellucidness of the Colourless Humours; from which many Rays from every visible Point of the Object, mix'd with no others, are collected into one distinct point of the Retina made by this Heat, neither too diftant, or too near; thence from the Motion of both those, from the Objects clearly and distinctly placed in a various distance, it is equal in Distinction, for fo Size, Figure, Distance, Situation, Motion, Rest, Light and Colour are best represented; from whence that Situation is express'd in the Tunica Retina, and that Expansion and Proportion betwixt the Medullary, Arterial, Venous and Lymphatick Substance, which brings the pure Images freely thro' the optick Nerve to the common Senfory.

The Rays therefore shine, not from our selves, neither are they again reslected from the Objects into our selves, as the Stoicks afferted; neither do we see from a visible Species sent from the Objects into us, as the Pythagoreans said; and scarcely from the Effuvia, emitted from the Object and the Eye, made before mutually embracing each other, and from thence resseating, as the Platonists argued; and lastly from

no material Emanation of corporeal Images, as Epicurus thought; but from the Laws of Mechanism, as we have explain'd them in the human Body, to the better Understanding of which the curious facob Raw of Amsterdam hath much contributed by his accurate Description of the inward Organ of the Eye.

Why do the Objects placed at the smallest distance, which the Eye can carry, that it may be distinctly

feen, appear so clearly?

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Why being remote they appear so distinctly at a great distance, tho' they seem weaker? Why do they look so confus'd? What is requisite to a distinct, and what to a strong Sight? Oc. all these things are easy from what hath been said.

Of Hearing.

COund is a tremulous Motion of the common Air, arifing from a fonorous Body concusting it, by a reciprocal Shaking of its fides. The Propagation thereof is made from the sonorous Center, first of all, by right Lines in the Circumference of the Sphere of its Power; and by that Law making its Progress and Reflection, which it obtains in the Rays of Light; only that its Propagation is made fuccessively, to wit, it performs 968 English Feet in the compass of one Second of a Minute; less or more it is equally fwift as it is spread abroad by a contrary Wind, which yet is less extended; it impresses its Tremblings from the elastick Bodies, but the elastick Bodies restect or turn those back scarce alter'd; but Hearing is the Perception of a Sound rais'd in the Mind, by the affiftance of that Organ, call'd the Auditory Organ or Ear.

Hence therefore it is known, saith Valsalva, first that the smooth Membrane of the external Ear, firmly stretch'd upon the thin, elastick, tremulous

Cartilage, adhering to the cartilaginous Basis of the Os Temporum, reflects strongly, the sonorous Rays received, neither stopping nor changing them.

But the Figure of the external Ear, hath several things worthy Observation in it; for the Eminence or Rising thereof, saith the foresaid Author, is remarkable, being placed above both the Temporal Bones, so that scarce any Rays of Sound can pass by both Ears together. But the three spiral Plica or Foldings of the Ears, by their Fabrick, Position, Subordination, Inclination, Winding or Turning, make it from the sonorous Point of the sounding Rays sent out, they are plentifully enough received and reslected back pure and uncorrupted from either or both Ears, but from thence being united together they are driven, saith Duverney, into the exterior Concha or Shell of the Ear.

But the opening Cavity of the Concha being elaflick and free, is form'd with two Muscles, by the Action of which, it is fitted to expand and yield to the various Motions received by it; so that being thus dispos'd, it may be capable of uniting the Rays close together, or dispersing them wider, and confequently accommodate it self, so as to temper or allay strong Sounds and increase the weak, as is

most necessary.

But the Auditory Meatus or Passage, consisting, according to Valsalva, of a Tube partly cartilaginous, partly osseous, cloath'd with a like Membrane, by degrees finer and very nervous, being defended with a little viscid Water and Ear-wax, trans-suding from the Glands seated underneath, being very sit for conveying the Sound unhurt towards the inward Parts; but the Obliquity of that increases the Superficies in this Canal, and multiplies the Places of their Resections; also the cartilaginous, triangular Tongue being tremulous and erect in the hollow of the Ear, but especially in the Orifice of the Meatus Audin

Auditorius, from the Region placed before, furnished with a Muscle, by an egregious Mechanism, makes it, that all the pure Rays are determined between the Meatus, neither do they issue forth however they are restected: The Figure of it is tubulous, cylindro-elliptick, ascending and descending by a Serpentine Progress, and by its Ascent again terminating in the Membrane of the Tympanum, increases its Sound and Restection, and makes it, that all the Rays run into the middle Center of its collected End, at the

fame time hindring its Clangor.

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The Membrane of the Tympanum agreeable to Duverney, being supply'd with a threefold Lamella, faith Ruysch, the middle of which is almost wholly vasculous, the outward ones have scarce any Vessels, so obliquely feated, that it inclines to the upper Parts of the Meatus, running out from the inferior, hence forming on the superior Part an obtuse, on the inferior an acute Angle with the Meatus; fo it more increases the Superficies, than if it was placed perpendicularly, hence it makes a larger Place for more Rays of Sound to flow in, and therefore it multiplies the tremulous Concussions; but first it occasions, that the Rays meet, especially into the middle Center of this Membrane, that it may easier shake; but since the exterior membranous Lamina are raised from the Auditory Meatus, from an intimate Membrane furrounding the Tympanum; hence it is plain, that Membrane communicates the less. with the external and internal Ear.

Hence the strict Application of this to the Border of the bony Meatus, the Thinness, Dryness, Loose-ness thereof, the hollow Figure on the Part of the Auditory Passage, but Convex on the Part of the Os petrosum, the Application of the Malleus to this, teach us, that this Membrane straitens the Ingress of Air, from the Auditory Passage into the internal Ear; while the Sordes, excrementitious Humours, Insects, Dust and

the like are invellop'd in the Ear-wax, and by the excited Motion of Titillation, first, from small Hairs growing there evacuated; the sonorous Motions are transmitted to the interior Parts; and perhaps here is something perform'd of Dullness of Hearing.

Duverney fays, the strict or close Application of the Malleus to the Membrane of the Tympanum, even almost to the Center thereof, with an extended Haft or Handle, while at the same time the moveable Head in the bony Sinus, and in the other Superficies of its Head, being furnish'd with two Tubercles in each Cavity, is fet together in the Articulation with the two Cavities, and one Eminence of the Body of the Incus, here suspended at Liberty; the artificial Infertion of three Muscles into this Malleus; for first of all here is, according to Aquapendent, Cowper, Bidloe and Casserius, the external relaxing Muscle of the Membrane of the Tympanum, which arifing from a carneous Beginning out of the upper Part of the external Margin of the bony Auditory Passage, ending in a Tendon, running under the glandulous, ceruminous Membrane, it ascends with its Tendon to the upper Parts of the Membrane of the Tympanum, where it passes by the Sinus left there in the Border of the offeous Ring, entring with its Tendon into the internal Shell, and descending even to the Tubercle of the Malleus, is there inferted betwixt the finking and rifing Apophyfis; from whence it is evident from the Action thereof, that the Malleus and Membrane of the Tympanum are drawn towards the Auditory Passage, and from thence lead the Membrane to a level or evenness, and Extension; in the second place, here is found the external Muscle of Duverney, which arising tendinous from the external Part of Eustachius's Passage lying carneous thereto, ascending upwards it enters the back Cavity of the Tympanum, form'd in the oblique Sinus, engrav'd upon the bony Margin of the Mem-

Membrane of the Tympanum, it inserts it self to the slender Apophysis of the Malleus, especially produced in the long, flender, flexible, elaftick Process, which John Jacob Raw hath discover'd here from his commendable Industry, and to which from the broad Application of the Fibres he hath taught, this Muscle is united undoubtedly for an admirable Use. to wit, that from its innumerable Determinations. it might lead the thicker Part of the Malleus and the Membrane of the Tympanum, towards the Auditory Passage. 3ly, The internal Muscle of Eustachius is discover'd by Duverney and Valsalva, which arising with its Fibres from the forefide of the Cartilage of Eustachius's Passage, thence contain'd in the offeous Semi-canal, running out laterally at the fuperior Part of Eustachius's Passage, leaving that with its Tendon emerging near the oval Fenestra, reflected as it were about the bony Trochlea or Cavity of the Ear. it is inferted to the Malleus of the same, at the back part under the Infertion of the external Mufcle of the Malleus, by the help of this Muscle being contracted, the Malleus is drawn, and the Membrane of the Tympanum, stretch'd towards the Os petrofum, and the concave Membrane reftored; I fay, all these things teach us, that the Malleus as a Leaver apply'd to the Membrane of the Tympanum, in the moment of Motion, resting or leaning upon the Sinus of the hollow'd Margin, as on a fix'd Bafis, to sustain its Rotation, stretch'd by the affistance of one, two or three Muscles, may first extend or remit the Membrane of the Tympanum, render it convex, or make it plain, direct or drive it different ways, hold it suspended, thro' various Degrees and various Directions. 2ly, For this reason it may alter the space of the internal Cavity of the Ear to draw in, expell and compress the Air, just as the Passage of Eustachius is open or shur. 3ly, Hence the Membrane brane of the Tympanum is adapted for the Reception of the harmonious Concussion of Sounds, communicated from tense Bodies, and easily bestow'd upon

the Incus, as Mathematicks teach us.

The Body of the Incus, faith Duverney, articulated with the Malleus, resting on the offeous Sinus at the Malleus; and free Suspension of its short Process from the suspensory Ligament, in the upper posterior Cavity of the Concha or Shell; the Connexion of its longer Process, with the little orbicular Bone; the Articulation of this with the tip thereof in the hollow of the Stapes or Stirrup; the Uniting of the Elliptick Basis of the Stapes with the Membrane of the Foramen ovale demonstrate, that the Concussions impress'd on the sonorous Membrane, by the help of the four little Bones, cover'd with their vasculous Periofteums, according to Ruysch, and joyn'd together by Articulations, faith Valfalva, suspended or hung at liberty in the great hollow of the Concha agreeable to Duverney, conftantly lubricated with an exfuding Humour, by which means Sounds may be communicated without Injury even to the Membrane of the Foramen ovale, and be impress'd thereon as fuch.

By this notable Artifice again, the Stapes may be stretch'd here, and the Membrane of the Foramen ovale, by the assistance of the Muscle of the Stapes; which is raised from a carneous Body from the offcous Canal, stampt on the Os petrosum at the bottom of the Tympanum, thence descending by a fine slender Tendon, it is knit to the Head of the Stapes, and by drawing obliquely, it depresses one and raises the opposite Part of that little Membrane.

Therefore Sounds unhurt and unchang'd, belong to this Membrane, but yet may be from this Apparatus extended to infinite degrees; hence therefore it is so apt to receive such an infinite diversity of Concussions, that contrariwise make the like Vibra-

Vibrations; and communicates them as fuch to the hollow of the Labyrinth, which being shut, covers

the Oval Entry or Window.

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The broad internal Concha or Shell, like an Elliptick Body communicating into the cellulous Caviries of the Mastoide Process; by Eustachius's Tube, partly bony, partly cartilaginous, gaping with an open Mouth towards the Palate, being shut by a cartilaginous semilunar Margin, having a Communication with the external Air, which is drawn in from the Nostrils or Mouth, makes it, that first, the Air can go this way into these Places, there to remain, be rarefy'd, pass'd out, renew'd and compress'd: 2ly, That it can be so reduced to a Temperament with the external Air. 3ly, That the fonorous Rays admitted thro' the Nose or Mouth, entring in hither, may expedite or affift the Hearing, when the Auditory Meatus is hurt or injured. 4ly, Because all those Places may be invested or cloth'd with a vasculous Membrane, here is a soft, lubricated Texture of Parts, that the Expurgation of all those Contents may be preserved.

But while the round Foramen, faith Duverney, being shut by a thin tense Membrane, lying open into one part of the Scale of the Cochlea; as it were in the Pan or Socket of this elliptick Space, placed in a contrary Center to the Membrane of the Tympanum, it forces those sonorous Rays into this Membrane: To move the Cavity of the Scale, and the Contents thereof, by communicating the airy Tremors or Concustions, yet perhaps not so accurately and distinctly as those are, which by the Help of the Membrane of the Tympanum, and the little Bones are impress'd on the Membrane of the Foramen

ovale.

Whether the Meatus or Passage of Eustachius, be opened by the Action of the internal Muscle at the same time, in which from the Application of the

the Membrane of the Tympanum in this Operation, the Cavity of the interior Shell is shut? Whether the Mouth thereof about the Palate be shut, from the drawing in of the cartilaginous Valve by the Contraction of the Muscle Cephalo-pharyngeus, hindring the Entrance thus far of the Aliment in swal-

lowing.

But notwithstanding Duverney's Foramen ovale opens into the hollow Vestibulum, or Entrance being fill'd, partly from the medullary Portion of the Nerves, which entring the Forameu from the Auditory Nerve by the internal Superficies of the Os petrolum, brought to by the smallest Holes made in the Vestibulum, being there distributed, dispos'd and confirm'd by three femicircular bony Canals, and as is observed again, they are feen to go out medullous; partly from the medullary Portion of a fost Nerve out of the foresaid Foramen, entring the Apex or very tip of the Cochlea by many small Holes, and from thence distributing little Filaments or Threads by the upper spiral Passage, from whence bestowing the soft Pulp on the Vestibulum under the oval Membrane; I say, it appears from these, that the sonorous Rays by this shaking Membrane, are carried together with the Help of those concussing Nerves, to the common Senfory, and there raise the Idea of Sound.

But the Fabrick of the spiral Cavity of the Ear call'd the Cochlea, seems form'd beyond all Admiration; while undoubtedly the offeous Canal being conick, is bounded about the bony Cone from the Basis thereof upwards from its Basis with two perfect spiral Windings, with one half from its tip to the tip of the Cone, being in the interim, every where divided from the Basis to the tip, even thro' the triangular Septum Medium, accurately into two separate equal Parts; which Septum, in the nearest Part sustaining the Cone, is osseous, smooth, tremulous and elastick in the outward Part, in respect to the

Strength of the Cone membranous and nervous, partly fixed to the preceding bony Part, partly to the bony Canal; so that these two Passages communicate nothing, nay the Mouth of the Superior lies open into the Vestibulum, but that of the Inserior is shut by the Membrane of the round Foramen; while in the mean time the little slender Nerves

are seen every repairing to this Place.

For by this Artifice it is brought to pass, that in this Lamella, from the determinate Basis ending in a point: infinite tremulous Cords equally stretch'd. may be diffributed; and therefore there are always amongst them innumerable quantities, which tremble or shake in an harmonious Consent with every Sound, and from thence may represent that, and can bring it as fuch to the common Senfory; for which reason therefore that acute Distinction of different Sounds, is perform'd by the Help of the oval Membrane, while from the Motion of the round Membrane, there is a simple Perception as it were only of a murmuring or humming Noise communicated which excites Attention, and in the fame manner likewise stretches the bony Organs, as they are fitted to that which is heard by diftinguilhing.

But whether the extreme Filaments of those small Nerves exercising their Office or Function, and being distributed by these Labyrinths, return again into the Cerebrum, and so to the common Sensory? Certainly there are infinite Numbers of Questions

remain to be inquired into.

As, why the Hearing is quicken'd by applying the Hand to the hollow of the Auricle, towards the Sound; and why on the contrary, when the Auricles are cut off, the Hearing is dull?

Why is the Hearing increas'd if the Plane of the Ear be turned from the Sound, to the Obliquity of

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Why is the Hearing clearer upon the Mouth being

open, and the lower Jaw hanging?

In crying, yawning, quick speaking or singing, why is there a Noise in the Ear and a Dulness of Hearing?

Why do deaf Persons, holding a creaking Body, in their Teeth, perceive the Noise it

makes?

Why do they often hear better by speaking into

their Mouths?

Why is there Deafnels, if the opening of Eustachius Tube be any ways obstructed? Why the same from the Membrane of the Tympanum being broken?

What way do some emit the Fumes drawn

in at the Mouth into the Ears?

Whence is it that in two Ears, there is but one found, and that without Confusion? All these things may be found resolved in Bartholomans Enstachins, Fulius Casserius, Fab. Aquapendent, Shelhamer, Duverney and Vallalva.

Of the internal Senses.

Rom all these things we know, that our Bodies receive nothing else from sensible Objects, that may make the Senses, than an Alteration excited in the Superficies of the Nerve by the Touch of the Object moved; which is produced from the Figure, Size, Hardnels and Motion of the fensible Body changed; so that it is probable, that the most different sensible Bodies if they were the same in these Four, they would raise the same Sense in the fame Organ.

Neither is this sufficient; but it is requisite that that Change be propagated by an unconstrain'd Nerve, even to some Place in the Medulla of the

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Cerebrum, from a fingle Nerve also into a particular Portion of the Cerebrons Medulla; which we are taught is so from Ligatures, Wounds and Corruptions of the Nerves of the Brain. But this Change is received there so small and that so simple, that nothing scarce is simpler; and certainly without that Simplicity it can scarce be examined or ex-

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But in the mean while, according to the Variety of the Object, the Diversity of the Nerve affected; the Distinction of the fabricated Organ of Sense, according to the Variation of the Place in the Medulla of the Brain, from whence that Nerve proceeds, the different degree of Motion, by which the Action of the Object is apply'd; there ariles in the discerning Intellect, an Idea perceiving variously and representing nothing that is in the Action of the Object, or in the Passion of the Organ; but yet the same Idea always follows the same Action of the same Object into the same Organ; from whence the Connexion of those Idea's follows the same Disposition of the said discerning Organ, as if the conceived Idea had been the effect of the Action of the Object upon the Organ.

Therefore this Diversity of Idea's does not seem to depend only from that Variety, from which the extreme Part of the Nerve is made; but from many others besides, not indeed Causes, but Conditions from the Institutions of the adorable Creator.

The Idea's oftentimes while they are perceived in the Intellect, likewise raise in this Representation Joy or Sorrow, or neither; these Indifferents produce Love or Hatred towards that Object, from the Action of which that Idea was excited.

But we are so form'd, that this very Condition of the Mind of Love or Hatred, stirs up in the Body such like muscular Motions, by the affistance of which the Object of Joy can be united to the Body

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or the Thought, or whose Efficacy can remove that so, that the Sorrow attending the Presence of it

may be blotted out.

But fince those muscular Motions, by the Help of the Spirits puls'd from the Brain into the Muscles are perform'd, hence it is plain that from every Point of this to the very Muscles obnoxious to the Will, there is a free uninterrupted Motion of the Spirits arising from the Brain; from whence the common Sensory is part of the Brain, where all those collected Points meet together; and therefore it is evidently the Medulla of the Brain in the Head.

As the Action of the Object is more diffinct in the common Senfory, the Idea arising from thence is

clearer and distincter.

By how much the Action of the Object is livelier in the common Sensory, the Idea rais'd from thence is the clearer.

The oft'ner the Action of the Object is renewed in the common Senfory, the Idea from thence is the

brighter.

The more foreign the Action of the Object is from all others in the common Sensory, and by how much the more unused, by that means the Idea

becomes more lively.

If therefore the Condition impress'd from the common Sensory, so strongly adheres, that it cannot be chang'd from the supervening Action of other Objects, the present Idea will remain as the Companion of that Condition. Or at least from the Occasion of the Cause or accessary Idea, the same Idea is restored to the Will; but if the like Conscience of what was formerly conceiv'd attend, it is call'd Memory.

But all this depends only on that simple Condition of the common Sensory, which is there only

a mere mechanical Disposition.

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Wherefore it may arise equally from corporeal Causes in the Body, wheresoever latent, affecting after that manner the Nerves, Spirits and Brain, hence exciting the same Idea's; and this Disposition is call'd the first Imagination.

If then the Memory of such an Idea, acting by reason of some external Object formerly raised, be so strong, and also the present Idea now depending on the internal siddens be so lively, it is the strongest Argument that the present Cause of this is now out of the Body, which is called the second Imagination.

If the Will in the common Sensory, and in the Parts efficaciously cohering to it, retains that Condition, which arises from the Action of a distinct and lively Object; or if it stops the Actions of all the other Objects, and keeps only the former, this Action of it is call'd Attention; from the effect of which, there is a distinct, clear and sprightly Idea that lasts long, and therefore may be call'd the Mother of Science.

From which are understood both those, commonly call'd the five external Senses, as also those internal ones, nam'd the Memory, Imagination, the Affections of the Mind, Attention; with which, Hunger and Thirst us'd to be reckon'd by some; from whence also, may be known the reason of many Enquiries about this Affair; as,

First, Why Corporeal Signs, having nothing besides the Will of the Institutor, so produce, direct, and change *Idea's*?

Why it is impossible to correct a second Imagination by any reason, but with violent Motion?

Why, one with another, the external and internal Senses flourish, voluntary and muscular Motion ceasing?

Why Attention, Remembrance and Imagination lull asleep the external Senses, and suppress the Motions of the Body?

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164 Of Waking or Absence from Sleep.

From what reason does such Weakness happen to the Body, where the internal Senses are vigorously and long exercis'd?

But from what reason do various Objects so often

exhilarate?

Why do Meat and Drink, Medicines, Poison, Rest, Motion, Air, Heat, Cold, Custom, Affections of the Mind, perform such Power in all this?

Of Waking or Absence from Sleep.

Hat Person is call'd Waking, in whom the Organs of external and internal Sense, as well as the Instruments of voluntary and involuntary Motions are in such a Disposition, that they can easily exercise their usual Motions: Which wholly depends on the Presence of the Spirits that are good and plentiful, in the Brain, its Medulla, Nerves and Muscles, as also on the good Condition of the solid Parts constituting the Brain, Nerves and Muscles. Therefore Waking is said to be that State of the Body, in which these two are in this Condition.

Of Sleep.

BUT the Knowledge of Sleep is much more obfoure, tho' it is only the opposite State to Waking, from whence there will be occasion, towards the understanding of its Nature, accurately to weigh all its Phanomena, which are these.

First, Falling from Waking into Sleep, they begin to be seiz'd by degrees, and exercise all their Senses external and internal with Difficulty, and also with a Sense of Weight in the Body, and at last they

rest altogether.

2ly, They

2ly, They begin to rest by degrees, from thence to cease with a Sense of great Resistance, to give

over all voluntary Motion.

3ly, But the Muscles appointed for exercising or performing these, fall, slag, decay, and grow paralytick; first of all, appearing in the Eye-lids, Face, Neck and Arms, and so by degrees extend over the whole Body.

4ly, All these corporeal Effects, and the Affections of the Mind cease, which are succeeded from

these Three, as from a Cause.

sly, Yet in the interim, the Motion of the Arteries, Veins and Heart, is stronger, slower, more equal and fuller, increasing thro various degrees, as Sleep comes on.

ely, Respiration is deeper, stronger, slower equaller, coming on gradually, and growing greater as

Sleep increases.

7ly, All those things therefore, which are made from these Two are persectly persorm'd; from whence is brought about that Persection to the Blood, which is required to the best Circulation, Concoction, Secretion, Perspiration, Distribution and Nutrition; and makes first, the Motion of the Humours quicker thro' the sanguiserous Vessels and near to the Heart, but slower at a distance therefrom, and otherwise excited thro' the voluntary Muscles.

Sense, being very much stirr'd up by the Object, or from an inconvenient Perception of Pain, or from a Disturbance occasion'd by too great a Compression of the Part, or else of his own accord; otherwise the more any one sleeps, the more sleepy they will be, till at last Life becomes one intire Sleep.

9ly, The waking Man first loos'd from Sleep, opens his Eye-lids, stretches his Limbs, yawns and

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returns to Rest awhile, till being refresh'd, he recovers his Strength again.

But Sleep is procured, cherish'd and increas'd in us; first, by solid and tenacious Food, too much eating, and Stoppage in the Stomach.

2ly, From too plentiful Drinking of vegetable fermenting Liquors, being the more fomniferous, as they abound more in Spirits.

3ly, From penetrating, flagrant, spirituous Aromaticks, from Saffron, Clary, Sage and the like, in which there is no obstructing Acrimony.

4ly, From Poppy, Hounds-tongue and Letticejuice, the Mandrake Apple, and the Virtue of Nightshade.

5ly, From a great Weariness, by a long continuance of Labour.

6ly, From the Quiet of a contented Mind, and a lazy Tranquility of an unactive Body, and an absolute Retirement from all sensible Objects.

7ly, From Excess of Heat or Cold, or it proceeds from some common Cause, whether from Temperature or Age.

8ly, From every such Cause which hinders the Arrival of the vital Blood into the Cortex of the Brain, and its Passage thro' the Vessels thereof, the Secretion of the Spirits so necessary for that Use; the Derivation of them into the Nerves, the Organs of the Senses, and the voluntary Muscles; the Ressure of those Spirits from all these Places, towards the common Sensory; hence comes Two Evacuations, apituitous Disposition of the Humours, a Plethora that is urging, Wounds of the Brain with a Phlegmon of it, Apostems produced there, Extravasation of Humours under the Cranium, Contusion of the Brain, its Compression, Ablation, Putressation, and many others of the like nature.

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In the next place, Sleep is disturb'd, first from a perpetual, slow Mixture of a wat'ry or warm Liquor with the Blood.

2ly, From a Vellication of the cerebrous Nerves, by fome Acrid.

3ly, From a strong Affection of the Mind.

4ly, From the Brain being irritated by some ex-

ternal or internal Cause.

Therefore Sleep will be that State of the Medulla of the Brain, in which the Nerves receive not from the Brain, either so plentiful or so strong an Inslux of Spirits, as is required from thence, that the Organs of the Senses and those of voluntary Motion may easily and expeditiously perform their Actions.

But the proximate Cause of this is perhaps the penury of a subtil Spirit, elaborated only with much more Ease and Quiet, and so wasted or consumed upon the Parts; from whence the little empty Vessels for a time slag and are scarce instated; or there is such a Pressure of the grosser Blood at the Cortex of the Brain, that hence the Medulla wrapt round by the Cortex, wants compressing to assist the Passage of the Spirits.

And the natural Cause of Sleep is every thing that can produce these two: From whence the Effects thereof are understood; for in Sleep some Actions cease, the Organs of these and the Muscles are at rest; the Spirits scarce slow thro' them, therefore they are less consumed or wasted; but the solid Villi and Fibres in the Nerves and Muscles are scarce chang'd; it obtains an Aquilibrium in all the Parts; neither is there a variety of Pressure in the Vessels, or that Diversity of Swiftness in the Humours.

But in Sleep the Motion of the Heart, Lungs, Arteries and Viscera is increased; neither is it here so altered or destroyed, by the Action of the Senses or voluntary Motions then ceasing: Therefore these Effects are produced, which depend immediately of them, and may be judged: 1st, The stronger and more equal Circulation of the Vital Humours, thro

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Canals then more free and lax, lying open to the Ingress thereof, not impeded by the variety of the Muscles; hence the Impulse is indeed less into the lateral Vessels, but more equal and forcible thro' the larger, therefore the lateral Pipes are fill'd by degrees, paffing less thro' them, till at last they are almost at Rest; the little adipous Bags are fill'd with a gummy Oil, and diftended as those of the Glands: hence the Circulation becoming fenfibly flower thro' the fanguiferous Vessels, at last is scarce observable if too long protracted; while in the mean time, the accumulated Fat as a Balfam spread around, defends the inward Contents, and flowly by urgent Necessity affords a small Quantity of Pabulum or Sustenance. 2ly, From whence in moderate Sleep, how excellently are the Materials of Chyle chang'd into Serum, that in thinner Humours, and those again into Nutriment. 2ly, The Exercise of the Parts cohering in the Solids grow by degrees flower. 4ly, The Secretion upon the Skin increases, the rest becoming sly, The best Recovery of what is lost, for an equal, continual Repletion, restores the Fluids, and is the best way of repairing the Solids; because the impeding, troublesome and destructive Causes are at rest: While in the interim, the matter is happily made red, there is a Fitness in the Vessels, for Reception and Readiness to enter the Humours, and in the mean while, the Causes applying and confolidating A& freely. Hence therefore there is a new Production and Accumulation of Animal Spirits, as to matter throughout all the Humours, and as to Repletion in the smallest Vessels.

Being thus refresh'd and comforted by Sleep, there is an Aptitude or Inclination in the Body to waking again, and an Unaptness for Sleep; from whence being stirr'd up from an accidental Cause the Man

wakes again.

Why,

Why, with a hot Head and cold Feet we wake and cannot sleep?

Why does Drunkenness proceed from spirituous

Things, and afterwards Sleep?

Whence come Dreams? And Whence Motion in

those that dream?

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In Sleep laudably taken not exceeding eight Hours, why is the Perspiration doubly greater, than it wou'd have been, in the same time waking?

How comes it that in sleeping too long, the Head is heavy, the Senses dull; the Memory weak; we perceive cold, Fatness, weight a Suffocation of Strength, the Muscles are unfit for Motion, and there is a Remission of Perspiration.

Whence does a continued Protraction of Sleep Support Life a great while without Meat or Drink?

How comes it that from hearty or found Sleep, Expansion of all the Muscles, repeated Yawnings, Sharpness of Judgment, Agility to the Muscles, and Strength to the Nerves, are always restored?

From what Effect do the Fætus's in the Womb always fleep, Children frequently, and Youth more

abundantly than Adults, or old Men?

And of what service is it, that such as are recovered lately from the most dangerous Diseases, sleep much longer than when they were perfectly well?

But the Reason, from whence the Muscles of the Heart suffer, not so much in time of Sleep, but on the contrary act otherwise stronger, seems to be understood if we have regard; 1st, to the Difference of the Brain's Sostness, being made up of Cavities, girt in and compress'd with strong venous Sinusses that are expansive, and crown'd with great external arterial Circles; and to the difference of the solider more compact Cerebellum, destitute of any hollow, neither bound in or compress'd with any Venous Sinus, not expansive or compressile, but only supplyed with Arteries and Veins. 2ly, Cardiack Nerves

Nerves that owe their Origin only to the Cerebellum. 3ly, Coronary Arteries that are fill'd and emptied at contrary times, according to the rest of the whole Body. 4ly, The Cavities of the Heart are fill'd at the same time with the Coronaries. 5ly, The Auricles and Cavities of the Heart are fill'd and emptied in Motion, and at Rest alternately; for from all these it is plain, the Reason of the Hearts Contraction is constantly renew'd, acts again, perisheth, or is at Quiet.

Of Respiration.

What Respiration is, and why it lasts without the Assistance of the Mind, will appear from what sollows: For Order requires that we search it out; and this Action not being frequently seen, is therefore hard to understand; 1st, because it is partly vital, and partly voluntary, as also, because so many Organs are used for the Performance thereof; wherefore it will be diligently enquired into, which may be most conveniently done by considering the Phanomena and Organs of Respiration.

The Lungs are suspended in Air, which hath free Access to them on every side, being equally press'd thereby, they fall together and contract themselves into lesser space, becoming much less than they were, while they hung intire in the Thorax, that Anatomy teaches: This Strength or Energy is discharg'd, first of all, by the contractile Action of the Muscular Fibres, and the squammous Segments

of the Bronchia.

The Lungs thus contracted, if they are fill'd with Air, blown into them thro' the Glottis; they distend from thence so far, that they take up the same Magnitude that they possess'd before in the Thorax, nay, they

they exceed that Number in space, as Experience informs us.

From whence it appears the Lungs always labour by their proper force, that they become less in all their Parts which happens so, while they are placed in the confined Thorax, hence they are always in a State of violent Contraction while the Man lives, and therefore close together and are lesten'd, while

the intire Animal remains in Boyle's Vacuum.

On the other fide, that it is not Air like that of the Ambient, betwixt the external Membrane of the Lungs and the Pleura, in all its Circuit in a healthful Man; therefore there is nothing that compresses externally the Lungs, but the Diaphragm; in the mean while, the Air always freely entring by the Glottis, is always there internally; from whence the Lungs is always little more extended by the internal Air, then it is compress'd by the external Air, hindred from the Diaphragm, being to knit to the Ribs and Vertebræ, that it cannot enter into the Thorax as is required, to make a balance.

Anatomy evidently demonstrates this Truth to be of great moment in these things; the Production and Increase of the Fætus in the Womb, and the Man out of the Womb, the Inflation of the Lungs; wounds penetrating the Cavity of the Thorax, procuring a Decay of the Lungs, and impeding the Dilatation thereof, sometimes inflicted on one, and then on both fides of the Breast; but especially the celebrated Experiment of Hook's perform'd on live

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Therefore fince in a larger Inspiration the Air, which before enter'd plentifully by the Glottis into the Lungs, extended them the more, it will overcome the natural Strength of them, therefore the Lungs luffers in this Action; but what they do, the Pha-

nomena teach us.

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In a Vital Inspiration, beheld first in a sleeping Man; the Nine Superior Ribs slicking in the Articulation to the Vertebra, and in the Union with the Cartilages growing to the Sternum, arise with the arched Part so towards the Clavicles, that the Motion is chiefly observed here in the middle of the Arch; but the three or perhaps four Inferior Ribs are turn'd out, downward and backward a little oblique; but yet so, that the Seventh, Eighth, Ninth and Tenth Ribs, with their cartilaginous Segments are drawn together, as it were inwards. 2ly, It also swells the whole Abdomen more and more by degrees, even to the End of the Inspiration, and squeezes it very much outward. 3ly, But at the same time the Capacity of the Thorax is inlarged, as the putting a Girdle round the Waste, and the Eye it self discovers, and especially, the Mechanical Contemplation of the Figure, Situation, Connexion and Articulation, polited with the greatest Art, concerning which, consult the Demonstrations of Botellus.

But in that very Action the Diaphragm, from its convex and finous Position which it had before, is brought into a Figure that is almost plain towards the lower Parts; for this, the Incision of live Brutes, the large Wounds of the Belly in them teach us; for that Change or Alteration of Figure depends on the Contraction of the musculous Structure in this Septum, as Anatomical Inquiry informs us.

Since therefore they are not otherwise in Inspiration, the Cause thereof will be determined by these things; to wit, the describ'd Motion of the Ribs and Diaphragm, wherefore we are to inquire into those

Causes which produce such Motions.

The Ten upper bony Ribs saith Vesalius, are arch'd or curved, and in the middle much more depress'd, than in the extream rising Parts; being articulated in both their Apophysis, surnish'd with a Cartilage.

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First, In the cartilaginous Socket or Trench being imprinted with Bodies united laterally backward, or in the sole Body of the first Vertebra. 2ly, In the cartilaginous Sinus ingraved in the transverse Process of the Vertebræ; they are joyn'd together by an arched cartilaginous Segment very elastick, to an obtuse Angle upwards; that Segment from thence ascending enters into the lateral Cavities of the Sternum fo, that as the Superior Rib, so the Angle of this Infertion is less at the meeting of the upper Part of the Sternum. The two lower Ribs, sometimes three being supply'd with one postick Apophysis, are articulated only to one Sinus in the very Body of its fingle Vertebræ, and with its Cartilages that are almost only tendinous, they reach not the Sternum, but being inferted to the Diaphragm and Cartilages of the next Ribs, disappear.

The Intercostal Muscles, that are external according to Vesalius, arising from the inferior Margin of the upper Rib, descend obliquely forward, and are inserted to the upper Margin of the Rib following beneath, with an intire offeous Circumference, but the internal Intercostals arising from the lower Margin of the Superior Rib, descending obliquely backward, cutting cross the former are inserted to the upper Margin of the Rib following beneath it, with

an intire bony Circumference.

But the Subclavian Muscle, saith Spigelius, from the lower half Part of the Clavicle, where it is joyn'd to the Spine of the Scapula arising carneous, goes obliquely forward to the upper Margin of the

first Rib, inserted near the Sternum.

Therefore if these Muscles are contracted or drawn together; then the first Rib by its proper Articulation is fastned sufficiently strong, by the force of the subclavian the nine following Ribs are rais'd upwards, and turn'd outwards, first in the middle Arches, yet so that they continue in an equal Parallelism, depres-

fing the cartilaginous Segments which are very much refifted, so that the Capacity or Breadth of the Tho-

rax or Cheft is sufficiently enlarg'd.

The Diaphragm as describ'd being contracted makes a plane or even Superficies; it strongly dilates the Thorax, constringes the Abdomen; conducts the anterior Cartilages of the Bastard Ribs inwards towards the Vertebræ, in some measure draws the two lower Bastard Ribs downwards, and distends the Abdominal Muscles.

And these seem to be the only Muscles, which perform Vital Inspiration; the Intercostal receiving Nerves, saith Vieussens, from the Dorsal Muscles, and the Diaphragm, according to Willis, from those of the Vertebræ.

Therefore from the enlarg'd Capacity of the Thorax, betwixt the Pleura and the Superficies of the Lungs, nothing pressing them, it follows the Air entring therein, is breath'd by the Glottis, till they are the same again, or rather continue accurately contiguous to the Pleura, and for this reason produce all those Things which are said.

From these remaining thus, the Air moves or acts upon the Lungs, with the same or equal Force as the Thorax refists it, therefore the Lungs are at rest, hence less Blood will pass thro', it will be moved in less Quantity into the lest Ventricle of the Heart, and fo less into the Cerebellum and its Nerves: Then least Arterial Blood will be thrown into the Intercostal Muscles and Diaphragm, therefore the dilating Caufes debilitate or weaken the Thorax, hence the Spring of the cartilaginous Segments depresses the Ribs again, from the affifting muscular Fibres, as Bidloo faith, arising from the side of the Sternum, within the Thorax, and from the offeous End, and also inferted into the Cartilage of the true Ribs; then the distracted Fibres, or those that are separated and drawn asunder of the Peritonaum and Abdominal Muscles

cles returning to themselves again, hence the Viscera compressing, thrusts the lax Diaphragm upwards into the Thorax; the Breast is then constring'd, the Air expell'd from the Lungs: Expiration is made, and all Things done, as were said; but in the first Place, the Passage of the Blood thro' the Lungs is accelerated and performed by these two Actions.

Hence, in this very moment the Blood being quicken'd again, begins to flow stronger and more plentifully to the Cerebellum and the Muscles; therefore the contracting Causes recruit the Intercostals and Diaphragm, Inspiration is renewed; and so there is affign'd a true, present and sufficient Rea-

son, for this alternate vital Motion.

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But besides these Causes of vital Inspiration, there are others happen which serve the Will, and also cleave to, or are apply'd to the Ribs, for the violent Dilatation of the Breaft, and its strong Constriction. The former tho' they serve for other Functions, yet they operate here, while they are thus determined or appointed for this Office. For the first Scalenus, saith Vesalius, rising sleshy from the forepart of the transverse Process of the second, third and fourth Vertebræ of the Neck descending obliquely forward, is inserted in the Tendon of the first Rib. Hence the fecond Scalenus arising carneous from the lateral part of the transverse Process of the second, third, and fourth Vertebræ of the Neck descending, it grows tendinous, and running over the first, it is inserted to the second or third Rib. Afterwards the third Scalenus, which arising carneous from the lateral forepart of the transverse Process of the second, third, fourth, fifth and fixth Vertebræ of the Neck, is frequently inserted to the first Rib; for by these the three upper Ribs may be rais'd, sustain'd and confirm'd, left the Force of the Intercostals, and other Muscles, should be directed downwards in a strong Inspiration; neither is the bending or turning

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ning round of the Neck hindred by the Force thereof; because if they act together, and if the Neck with its erecting Muscles, according to Cowper upon Bidloe, the spinal, the transversal, interspinal, the longissimus dorsi, semi-spinatus, by sticking close be strength'ned, the Action of the Scalenus necessarily raises the Ribs; but in the most violent Respiration, there are many more concur than we are fure of: In the fourth place the Serratus anticus minor of Vefalius, arifing carneous, from the Coracoide Process of the Scapula, descending obliquely forward, being made larger, flenderer and fleshy, is inserted into the anterior offeous Part of the second, third, fourth and fifth Rib. sly, The Serratus anticus major, arifing large, thick and fleshy, from the Basis of the Scapula, descending obliquely forward, is inserted in the eight upper Ribs, as it were in the carneous Parts; two or three whereof, are inferted below among them, with the like Processes of the external oblique abdominal Muscle. For if the Muscles of the Scapula, the Trapezius, Rhomboides, and the Levator, make the Scapula to and again immoveable, then the Action of both or either of the Serratus raises the Ribs strongly from the second to the eighth; which we may plainly see in the most for-cible Inspiration. 6ly, From the back part of the upper Serratus posticus, arising tendinous from the Spines of both the inferior Vertibræ of the Cervix, and the three superior ones of the Thorax, is inserted with carneous Teeth to the Curvature of the second, third and fourth Ribs, raising these obliquely up-7ly, The inferior Serratus posticus affists, which arising from the Spines of the Vertebræ of the Loins, and sometimes from those of the Thorax, is inferted with clinging Fibres to the middle Arch almost of the ninth, tenth, eleventh, and the Extremity of the twelfth Rib; for here, from a kind of horizontal Course of Fibres, conducting or grinding

these last Ribs outwards and backwards, it enlarges the Breast, and hinders, lest from the contracted Fibres of the Diaphragm being drawn together, these Ribs shou'd constringe the Thorax.

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But the Action of the oblique exterior Muscle, that of the inserior and rectus conspiring together, depressing the Ribs, binding the Thorax, giving Resistance to the inserior Serratus anticus, if it concurs or agrees with the Action of the Sacrolumbalis of Vesalius, as yet a compounded Muscle that is scarce distinctly described; it consists of a Series of Muscular Carneous Fibres, arising from the transverse Processes of the Vertebræ of the Loins, and the Spines thereof, and of those ascending into the Ribs and joyn'd there says Steno, by carneous accessory Muscles proceeding from the Ribs: This Action I say, powerfully assists a violent Respiration, together with the Constriction of the Abdomen, by the Help of the transverse Muscle.

The Sternum being compress'd in Women, and the right Clavicles, the Thorax grows narrower, the cartilaginous Segments of that Clavicle grow sooner into Bone on the upper Part, than the lower; hence the Sternum in those Inspirations is turn'd upwards and obliquely outward, and the whole Thorax does as it were rise, hence also they respire freer, when their Bellies swell, or they are with Child.

It is necessary that the Muscles serving for Respiration, and such as are obedient to the Will, shou'd be much larger and stronger than those which perform Vital Respiration: Whence it is, that the Strength of the former, serves to encrease or diminish, or intirely to put a stop to either Respiration of the efficient Actions.

Hence is to be understood, that there are not two natural moments that happen in the Life of Man, in which the Pulmonary Vessels possess the same Figure, Size or Action.

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So that there is an Antagonism in this Place to some Muscles, without an Antagonist Muscle: Therefore the Antagonism is betwixt the Action of the Fluid moving the Muscles, and betwixt the Resistance of the simple Spring in the Solid.

From hence, there is no need for alternate Motions, acting reciprocally in both Parts, to suppose alternate Actions of the Humours, for 'tis sufficient

if it happen in either.

Human Will can stop the Force and Cause of Respiration, but it cannot directly stop the strength of the Heart, therefore the Consent of the Hearts Motion is stronger, more constant, and its Action frequenter; yet there is some Cause betwixt the Pulse of the Heart, and Times of breathing, but by what Law we know not?

Hence we see a Necessity of the Hearts Pulsation from the Repetition of Respiration; but how long Life can continue without that, is the Que-

flion?

Why in an Ashthmatick Insult, a Peripneumonia, difficult Breathing, in the Agony of Death, Respiration is made in the vital and voluntary Muscles, strongly concurring to the same Action, so that we see the Neck, Scapula, Breast, the lower Ribs and Back plainly move?

Why in perfect Health, when the Body is waking and at Rest, is Respiration so slow, quiet and silent, that it is scarce observed, while at the same time there

is a quick Circulation of the Humours?

Why in a Cough, short Breathing and an accelerated Respiration, is the Motion of the Blood increas'd thro' all the Vessels?

How comes the first Action of Respiration to be

Inspiration, but the last Expiration?

Why in dying Persons, while Respiration ceases, do the Venous Sinusses, the Auricles and the Heart palpitate?

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Of the Voice, Speech, Singing, Laughing, &c. 179

And how it is that in performing Respiration and continuing of Life, the Air is plainly useless in the excessive degree, whether heavy, light, moist, dry, hot, or cold; as also that which is too much compress'd or raresied, as well as that which is not soon enough renew'd in a small Space.

Of the Voice, Speech, Singing, Laughing, Coughing, &c.

Itat this may be clearly conceiv'd, how a Man utters his Voice; this Sound is form'd from Exspiration; therefore it is from the Expulsion or driving out of the Air, contain'd in the whole Capacity of the Lungs, into the Aspera Arteria, by constringing the Thorax, from the Aspera Arteria into the Glottis, saith Casserius, where from the Narrowness of the Passage the Motion is swifter, being broke or divided by the elactick tremulous Body, hence smitten into reciprocal Streams, it makes a Sound, as the Naturalists teach.

But that going out from the straiter Passage of the Glottis, into the Cavities of the membranous Body of the Mouth and Nostrils passing by these Places, as these Furrows, Trenches or hollow Places are smoother, rougher, opener or straiter, or otherwise significant various ways, so different kinds of Sounds issue from the Mouth; as the Workmen who deal in Instruments of Sound, especially those

who make Organ Pipes demonstrate.

But fince the cartilaginous Sides forming the chink or cleft by its binding, can open or shut this chink by innumerable ways, as the Muscles placed here, act variously; hence arises the Difference of the Voice, as to what is call'd by the Musician, acute or grave; for all that Business depends on a swift

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or flow Repercussion of the Undulation; but this is done quicker, by narrowing the way, or increasing the Celerity of expelling the Air, on the other hand, the Gravity of the Voice is a slower Essect of the undulating Air, being deduced from a greater Aperture of the Chink, or a slower breathing out of the Air.

Hence it appears, from the Chink being too much dilated, that the Sound is destroy'd or lost in them, who endeavour to produce a graver Sound than indeed they can effect; also the same thing happens in the Formation of the acutest Sound, that it almost brings a Suffocation, and causes a squeaking Voice

to proceed from the Larynx.

If that Sound in the Organs situated without the Larynx, to wit, the Throat, the Tongue, the Teeth, the Lips, Cheeks, Noftrils, membranous or muscular Paalate, in the various Meeting and Position of each being very much varied, is broken or divided, thence in its Passage thro', or Reslexion, be alter'd and determined or directed, it makes that which is express'd by Letters, concerning the Rife and Combination of which, and from thence, the Formation of Speech, let us look into the Works of John Conrade Amman, printed at Amsterdam 1692, who hath been a Man of vast Industry this way, and very eminent for his Success in the Cure of dumb Persons; neither ought we in this Place, to forget the Labours of Mr. Ford late of Kenfington, who hath brought this Art to fo great a Perfection and Certainty, that he makes the Deaf as well as the Dumb to speak intelligibly.

But fince to fing is to pronounce the Sounds according to Gravity or Acuteness, swifter or slower, stronger or softer, equally or by being setch'd about, the Action of it is understood from which is said

before.

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A smooth, subricated Superficies in the Organs, seems to give a Sweetness to the Voice, so likewise

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The Agility of the Muscles serving to move the Glottis, the Laxity that follows the Cartilages of the Ligaments, knit to the Larynx, the Size of Difference, that the Structure of the Glottis admits in its Aperture, seem to produce a ready Faculty for the distinct and clear Formation of various Sounds.

The Construction of the Lungs and Thorax, producing such Extension, seems to be the particular Reason of their Strength and Usefulness to the Body; so the singular Turnings in sweet Singers de-

pends on all these together.

Laughter is made, from the Dilatation of the Lungs, the Air being then received with quick yet small and reciprocal Concustions, made by the inspiring and exspiring Organs, as if moved by little Waves moving in the Lungs, and in the Aspera Arteria; in the mean time, the Lungs continuing in the same Extension, they rather shake than transmit the Blood thro' them; whence we may know, the Reason why Laughing wearies so much, and often turns to a Convulsion; first of all, only swelling or distending the jugular Veins, and those of the whole Head; afterwards giving Redness to the Face, the Neck and Eyes: Sometimes if too extravagant, it brings on an Inability to take Breath, sometimes Apoplexy and Death it self: But on the contrary it is very healthful, if moderately used.

Also Coughing is evident from thence, for it is made from too great a Plenty of Air drawn into the Lungs, held there but a little, soon after by the Larynx being shut or clos'd together with the Diaphragm, thrust into the Breast by force of the Abdominal Muscles, the Air is condensed; that strongly presses against the sides of the Lungs, from thence the Larynx being open again, it is violently shock'd, by the reciprocal exspiring Concussions; hence it

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rgans, cewife 182 Of the Voice, Speech, Singing, Laughing, &c.

purges the Superficies of the Bronchia, whence is understood why Laughing so often ends in Coughing? How small the Difference is betwixt these two Actions? Why strong Singing, Scolding, the Afperity or Roughness of the Bronchia produce it?

So also sneezing already spoken of, is clearly understood from what hath been said: Gaping or Yawning comes from expanding or stretching almost all the voluntary Muscles together, especially the Lungs, which breaths in some small matter of Air, tho' flowly and by degrees, and that being retain'd there some short time is rarefied, and exspired again, as it was received, reftoring the Muscles to their former State and Condition. Hence the Effects thereof is to move, accelerate, and equally distribute all the Humours of the Body thro' all its Vessels; and therefore adapt the Organs of the Senses, and the Muscles of the Body, to their proper Functions.

But how these Things are done, the erect Figure of the Body, its Bending and Extension in the Neck, Back and Loins; the various Motions of the Shoulder, Arm, Wrift, Hand, Fingers, Thigh, Leg, Ankle, Foot and Toes, on which depend, Standing, Walking, Leaping, Running, Tumbling, Oc. explain by their proper Organs of Motion, concerning which, we may look into Fabricius ab Aquapendent, and Borellus of the Motion of Animals; for this cannot be fet forth in this Compendium, much less sufficiently demonstrated as is requisite.

Therefore fince we have thus far explain'd the Vital, Natural, and Animal Actions which are common both to Men and Women, it remains that we consider, those which regard or are proper to either Sex, for the Generation of their Off-spring, as they are absolutely different from each other, as well as they differ by reason of Age, Temperament or the

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The Origine of the Masculine Semen.

HE Seminal Arteries arising from the Fore-part of the Aorta under the Renal Arteries, faith Vesalius, altho' sometimes it is call'd from the lest emulgent Artery, descending obliquely with the spermatick Veins of its own side, the right whereof arises from the Cava under the Renal, the left from the Renal Vein, they are joyn'd together at an acute Angle included with these, with a common membranous little Sheath, being as it were closely conjoyn'd, fo also they run securely together. cover'd under the interior Lamella of the Peritonaum. upon the Ploas Muscles, and the Ureters, till they come at the Place of their Exit, in the Groin, where Spigelius's carneous Fibres of the transverse Muscle and the oblique inferior one, receding a little mutually from one another, transmit these Vessels included in its Sheath, fo that the transmitting Place being highest in the transverse Muscle, the other is lower in the oblique ascending one, and then also passes thro' the oval Ring, in the tendinous Part of the oblique ascending Muscle, with three lines inferior to the former; lastly, this Vagina descends with its Vessels upon the Os Pubis, and being brought into the Scrotum, makes the Testes it self; but in all this course, from hence it binds out small lateral Arteries: And then the three Places transmitting in the Muscles, bestow upon that a little, thin, membranous Vagina, but where it approaches nearer to the Testes, they constitute the Pyramidal Body.

In this very course saith De Graef, the spermatick Artery being bent a little into Spires, sends forth Arterial Branches, which in a right, open and sufficiently large Road, derive laterally the Arterial Blood into an associate Vein, by a true Anastomosis or Inosculation; first of all, in the Pyramidal Body,

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184 The Origine of the Mascular Semen.

where the seminal Artery near to the Testes, bestows a Branch on the inserior, and inward Part of the Epididymis, affording little Branches to that, from whence 'tis inserted to the nervous Coat, and another Branch on the very top of the Testes; but there are many Branches from the large Trunk intimately mixed and communicating with the little Veins in the pyramidal Body, from whence they are spread all over the Circumserence of the Testes.

For the pyramidal Body, call'd varicose, or pampinisorme, consists of innumerable communicating Veins, which being united, make up as it were a Netlike Texture, ending in one seminal Vein, from whence there is conveniency of pouring in this

Blood into the little Veins.

Those Arteries which have penetrated the nervous Coat, being ordinarily divided into Branches according to de Graef, distinctly placed; then into innumerable small ones, as Ruysch shows, hence going into the sinest Capillaries which appear infinite to the Senses, they possess almost the whole Body of the Testes, and perhaps usually possed into larger Vessels, says de Graef, ending in one great Trunk, the middle of the Testes continued to the Epididymis, they spue out their Humour or Fluid from a vast Number of little Mouths; hence they have no Veins, but end in Emunctories.

But those Vessels, saith Leal Lealis, are determinated in the Epididyma and the Parastata, casting out their Humour into its hollow Canal; but its Fabrick or Structure is one continued, hollow, cylindrick Vessel, complicated into innumerable Windings united together, and incumbent on the Body of the Testes, being watered by the Arteries, is brought into one Vessel ending in the ejaculatory one; which rising again above the Os Pubis, descending into the Pelvis, approaching near to the back

part

The Origine of the Masculine Semen. 185 part of the Neck of the Bladder, is determinated in feminal Veffels.

To the same Structure thus form'd, are join'd the flender Nerves, from the nervous abdominal Network, together with the spermatick Vessels, beflow'd on the nervous Coat, being loft in that and another that arises from the Twenty first spinal

Pair.

The little small Veins and innumerable lymphatick Vessels, return that Humour again from the Body of the Testes, which remains from the Secretion made, which is probable in these in which it is elaborated, neither is there an Evacuation of the greatest and subtilest part of the Semen to be re-absorb'd in these Vessels, to be mix'd in the pyramidal Body with the venous Blood, and by this means

change the whole Oeconomy of the Body.

The seminal Vessels of de Graef, knit to the Neck of the Bladder on the back part by Membranes, are little blind Intestines, saith Leal Lealis, complicated into Windings, Turnings and Recesses, in which the ejaculatory Vas ends, by degrees growing broader and more finuous, then again straiter where it enters in, curved by a ready Road into these little Intestines, towards the larger bottom of those; and hence again, according to the same Author. from another emunctory Canal join'd to the former at acute Angles, which is endowed with a Vesicle, which two Emissaries, join'd in the Urethra by an obtuse Angle, end in one Emunctory Canal, lying open in the Urethra; in the mean time, both these Veficles are tyed together with a musculous Mem-

All these things demonstrate the Blood to be like that of the Kidneys, small in Quantity, received from the spermatick Artery, moved slowly, and detain'd about the pyramidal Body, destitute of the thick red Blood by the Canals opening into the

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Veins: hence it is less red there, being much flower moved, and almost stagnating, in the narrow Passages and Windings of the Testes, which are, as it were of a cineritious or ash Colour, the Blood being nourish'd and kept warm, adhering and growing thicker in Highmore's Ducts; is more flowly puls'd into the Epididymis, is again blemish'd and elaborated from the Foldings thereof; and at length found in the ejaculatory Vessel, opening wider by degrees, from whence in its dilated finuous Recesses it is collected, kept at rest, nourish'd and elaborated; and also from the broader, convoluted, seminal Cells of the Veficles it is propell'd, received, and flor'd up, being intirely quiet and growing thicker, it attains a greater Whiteness, and so being elaborated to its utmost Perfection is call'd Semen.

Hence no Humour is produced with so much Slowness, or retain'd by so many Ways or Passages, or being at rest is cherished and encourag'd; but whether in all that obstructed Course, any thing accrues to it, by the minute nervous Vessels or other ways, is a Question? But there is brought to it thro' the Variety of Lymphaticks, something of a subtil Fluid, thrown into the little Vessels of the pyramidal Body, or the small Veins of the seminal Vesicles, from whence again it is carry'd into the Humours of the whole Body; both of which is highly

probable.

The Humour which is found in the very middle of the Testes in the Epididymis, in the ejaculatory Vessel and seminal Vesicles, being fresh, warm and a little diluted, then look'd upon with the best Microscopes, consists of innumerable, fine oblong, little, live Eels, swimming in the other part of this Humour; but this is in every Man, Quadruped, Bird, Fish, amphibious Creature and Insect, and that always, and only in this place, according to Leenwenboeck: If these things are compar'd with the Size,

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Size, Figure, Place and Change of the Chicken in the Shell, describ'd by Malpighius; and with the obferv'd Law of Nature, in the Generation of Frogs; it will appear probable, that these Animalcula of the Masculine Semen, contain the first Rudiments of the stuure human Body; especially since where the Testes or this Humour is wanting, there is always Barrenness on the Part of the Male.

In the same place, saith de Graef, where the Exit of the seminal Vesicles opens into the Urethra, the Glandula prostata of the Urethra arises about it, being one continued, conick Body, bound about with muscular Fibres, composed of Twelve distinct Collections of Glands, so that the Glands of every Aggregate, terminating by their Emunctories in one Bag, to which they pour in their Humour, hence the Twelve distinct Bags open with as many distinct notable Emunctories into the Cavity of the Urethra, so that they bind on every side that Exit of the Vesicles; from whence they nicely mix the Semen and the Humour of the Prostata, while the Vesicles and the Prostata are encompass'd by the same muscular Membrane.

The Humour made here, is soft, fat or oily, white and copious; after continued Abstinence from the Act of Venery, it is frequently expressed in the Action of Siege or Urine. This Humour contains not the described Animalcula in it, upon taking away the Testes and seminal Vesicles, neither is it then prolifick: Hence the thicker and more cineritious Semen seems to dilute, and perhaps in the sirst moments from the Coition to nourish the said Animalcula.

The Urethra consists of Two Membranes, and a cavernous Body plac'd betwixt these, the cavernous Body thereof being thickest betwixt the end of the Prostata and the Union of the cavernous Bodies; from thence growing slenderer in its whole Course, it is grosser at the forepart of the Penis, turning out,

it leaves the Mouth of the Urethra open in the middle of the Glans, but by that means constitutes the external spongy Superficies of the Glans; terminated in the outward Skirt or Edge thereof, about the Connexion of the Prepuce or Fore-skin, it receives into the Cavity of its Pipe oblique Emunctories, according to Drake, from the Glands affign'd by Cowper, making a soft Humour especially upon a flaccid Penis, that is bestowed for necessary Uses on the internal Superficies of the Urethra: In the external Superficies of the Glans, Ruysch saith, it is covered with a little, subtil Membrane, under which lie hid the sensible nervous Papilla, which are the particular and immediate Causes of Pain and Pleasure.

The cavernous Bodies, arising from the inferior Part of the Osa Pubis separately, are cloth'd with its Membrane, and join'd mutually to each other by the Help of the Septum Medium, being lost by degrees at the anterior Parts, they make that particular Body of the Penis, which being made less sensibly at the Foreparts under the Crown of the Glans, constitutes the interior Substance thereof; hence all this Body thus compos'd or form'd, is surrounded with a cellulous Membrane of a wonderful Texture; from hence with a firm or strong nervous Case or Covering confining its Extension; and lastly with the Cutis and Cuticula.

The Arteries, saith Graef, from the internal Iliacks, frequently carry the Blood into the very hollow cavernous Bodies of the Urethra and the Penis, where being divided into innumerable capillary Arteries, they are continued into Veins, but in these there are innumerable hollow Cells, according to Ruysch, that communicate amongst each other, and all evacuate themselves into de Graef's great Vein, running singly thro' the back part of the Penis, under the Ligament joining the Ossa Pubis, about the Prostata, lastly dividing into Two Branches, they

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evacuate themselves both ways into the internal Iliack Veins; but the Veins of the cavernous Body of the *Uretbra* are placed for a necessary End or Design to those Muscles call'd the Acceleratores.

If therefore from what Cause soever, the Animal Spirits flow more from the Brain into the Nerves of those Muscles that erect the Penis, than those Muscles, says de Graef, arising from the external Bunch or Knob of the Os Ischium, under the Origin of the cavernous Bodies, are inferted in the firm, nervous Covering of those Bodies, and there growing tendinous are lost, the Body of the Penis is press'd closer to the Os Pubis, and the middle Ligament thereof: The great Vein of the Penis is more compress'd, the Veins of the Prepuce less; therefore the Arteries and the Veins are both fill'd, hence the Vein is more compress'd, from whence the cellulous Sinus's are fill'd with Blood; being therefore thus inflated, the Penis, the cavernous Body and the Glans all swell; fo that by this means the tumefying Causes increase, from whence the Penis grows stiff, reddens, and is erected; in the interim, the muscular Membrane of the Proftata and the seminal Vesicles, from the same Cause ought to swell, and all the Nerves be stretch'd, hence the Semen from the Vesicles, the Humour from the Proftata being express'd, are gather'd together in that part of the Urethra which is free from the erecting Muscles; while the transverse which are imprinted from the external bunching of the Ischium into the upper Part of the Bulb of the Urethra, and the Dilatator posticus from the forepart and the lower of the Intestinum rectum, being fix'd into the lower and hind parts of the Uretbra, dilate it here at the fame time; lastly being violently compuls'd by the Accelerators of de Graef, which arising carneous from the upper Part of the Urethra under the Os Pubis, furrounding the Bulb of the Urethra, join'd below, they run together, and are both inserted to the strong

strong Membrane of the cavernous Bodies of the Penis, and likewise being convuls'd with the Muscles of the Profesta and the Vesicles, the Blood is chiefly driven into the Penis, and the Semen ejected with Force, the Spirits cease their Motion, the Vein is freed, the Blood flows from the Sinus's into the Veins that are now relaxed, the extended Parts contract themselves again, and the Penis flags or falls.

Hence therefore it may be known, what the Man contributes to Generation, the wonderful Rife of the Beard and Puberty, also the Alteration of the Voice, Temperament of the Body, the Affections of the Mind, that either accompany or follow the Production of the Semen. Hence we may know, that the Semen is different or opposite to the Nature of the Animal Spirits, that of an oily, volatile, falt, or an hot fermenting Humour, but is a foft, viscous, fluggish, or unactive Fluid; and it shows that the transversal Muscles of the Penis, are of eminent Service for dilating the inferior Part of the Urethra.

Of the Menstrua.

Omen have the Os facrum broader, and turn-ing more outwards than that of Men, as also the Os Coccyx yields or gives more way backwards; likewise the offa innominata are broader, and stand more at a distance from each other, and underneath they are turn'd a great deal more outward; together with the inferior Risings or Eminences of the Os Pubis, which have the same bearing: Hence, faith Spigelius, a Woman hath the greatest Breadth about these Bones, the contrary of which is in Man, as also a greater Capacity of the Pelvis than what is to be met with in Men, yet in a Woman that is not with Child, there are not many things which

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fill her. Women have the forepart or appearance of the Breast much flatter or plainer than Men; but the Blood Vessels, the Lymphaticks, the adipous and nervous Ducts, the Membranes and Fibres are much laxer in Women: Whence all their Cavities, Cells, Vessels, &c. are easilier fill'd in them, and the Humours collected together; and hence the cellulous and adipous Membrane is always the thickest; but it is found again to perspire much less than that in Men us'd to do, and therefore they much sooner arrive at the acmen or height of their Growth.

In this *Pelvis*, the Situation is foft and pulpy, confifting wholly of Vessels, easily extensile, neither is the Womb very elastick, but almost free, neither is it fixed or scarcely compress'd, while it is defended from the expanded Membrane of the *Peri*-

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But that consists of Membranes and Fibres of a turbinated or top-like Figure; according to Ruyseb and de Graef, it receives Arteries from the Spermaticks and Hypogastricks, united amongst themselves by Anastomoses, surrounding the whole Womb, and as it were, constituting the greatest Part of the uterine Body, from the like Apparatus and Origin, all the Veins equally communicate amongst themselves, so that the Humour can pass and re-pass from one thro all the rest; it is penced thro in its internal Cavity, not only with the Emissaries of the Fallopian Tubes, but with many small Passages, exsuding a soft, watry, mucous Humour, with which the Cavity of it is internally lubricated, defended and hindred from Concretion.

As soon as a healthful Virgin hath arrived to the Term of her Growth, she begins to make more quantity of good Humours than is required to support the Body, since there is nothing further necessary to its Increase, she will fill more the Vessels, especially those of the Womb and Breasts, tho they

are very gently compress'd; this will dilate more than the rest, hence it extends the lateral Vessels that are very full, evacuating an Humour into the Cavity of the Womb; from whence, Pain, Heat and a Weight are perceived in the Loins; at the Pubes and the Groin; a small Fever is raised; the Vessels of the Womb are dilated, so that they express the Blood it self into the Cavity of the Uterus; the Mouth whereof is lubricated, relaxed, and the Blood issues out; so that its quantity is lessen'd, those Vessels are not pres'd so much, but contract themselves, the Blood is retain'd; the groffer Part of the Serum is let out; at last, that accustom'd Lympha only, makes more of the Humours again. which is easily deposited into the Vessels that have been once dilated; hence the Menstrua are evacuated, and return at different times according to different Constitutions.

But since the Mammary and Epigastrick Arteries, have a wonderful Intercourse with each other, by the Communication of their Anastomoses, according to Nuck, it is evident, the same thing is in the Veins; for upon uterine Evacuations the mammary Veins are less distended, and when the Menstrua are approaching, the Breasts swell, and so on the con-

trary.

Hence is understood, why Women who are of a harder Compages or Texture of Fibres, or dryer, likewise such as are very musculous and less fat, and also daily used to hard Labour, do less, and that slower and by longer Intervals, and sometimes excern no menstrual Blood at all? While at the same time, the softer, laxer, and such as are more juicy, and in some measure fat or plump, that are not so musculous, and live a lazy or idle Life, void greater quantities of Blood, that swifter and in a less period of time? And also, why this Humour retained here, makes to it self such various ways, with other

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other Vessels that are dilated, and expels them periodically? and why lastly the Menstrua shou'd begin. increase, and end in such a certain time of Age, in which they foonest arose? and why they cease again immaturely in the same?

Of Conception.

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Onception, saith de Graef, depends on two superior Foramina of the Womb, issuing from two membranous Canals, dilated by degrees round the Matrix, from a narrow Capacity, winding or turning in little cellulous half Circles, at last from a broad Orifice furnish'd with carneous Edges, plac'd about it; they confift of an interior glandulous Membrane with fleshy Ligaments; but these Tubes in almost all kinds of Animals at the Time of Conception swell and grow rigid or stiff, being supply'd with Caruncles: In the Diffection of the Dead Bodies of Women, the Tube is often seen surrounded with a rim or border of little Eggs; also in the cellulous Recesses of those, Fatus's have been found, in different Places and of different Sizes, according to the time of Conception.

The two Ovaries are laterally knit to the Uterus, faith the same Author, about two Thumbs breadth distance, and which by the Assistance of other Membranes arising from the Peritonaum, are strongly inclos'd; these are rough, of an uneven Supersicies, sufficiently large, spherical Bodies, included in a strong Membrane, they are water'd by the spermatick and hypogastrick Arteries, united so before their Entrance into this Place, as if one Vessel being thus form'd, they seem to constitute a reticular or network Plexus, by reason of the incredible Number of Corpuscles, the same is true of the Veins seated here, and also of the numerous lymphatick Vessels;

all

all these Vessels with the Nerves as they make the Structure of the Ovary, so they are intermixed that the Fabrick can scarcely be describ'd; but in the Superficies of the Ovaries bound under the Membrane, are found little spherical Bodies underneath, concreted by a thickish Shell, from the very Substance of the Ovary, of a pellucid Colour, replete or fill'd with a Lymphatick Humour, that thickens at the Fire, consisting of two little concentrick Membranes, strictly tyed by turns to each other. Besides Ovaries are present in every sound semale Body, tho' in Youth before the Years of Puberty, they are small, by degrees they grow larger, but are biggest at the Time of Conception, but they are observed to lessen or diminish again in Old Age. But the little Bubbles already describ'd, lodging in their Shells or Cups at the minutest Ends or Terminations of their Vessels, just after Venery scarce appear at all, but by degrees tumefy, by little and little become pellucid, grow thicker in their Membranes, raising and extending or stretching the Membrane of the Ovary, so they dilate into the Form of a Papilla or Nipple, that they feem to hang like Fruit each upon its Stalk, from whence being separated, they have a Cicatrice or hollow Scar, in the Substance and broken Membrane of the Ovary, healing or co-alescing again by degrees; at length in these little Bubbles, lodging in this part of the Ovary, the Fætus's have been discover'd.

From all which it appears sufficiently plain, that these little Balls or Bubbles are Eggs, which derive their Structure from the Vessels of the Ovary, but its Liquor from the Humours wonderfully prepared there: And therefore this admirable Fabrick destined or appointed for this Office, is intirely from

Nature.

from whence is known, that the Tubes being stimulated by Venery, grow stiff, from the rigid muscular

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cular Fimbria or Edges like Fingers embracing the Ovaries; these being press'd close, expand or open their Mouths from this Embrace, then the Egg being ripe and separated, by degrees is squeez'd into its Cavity, and propell'd by the leisure Motion of their muscular Ligaments, at length is sent down into the Cavity of the Uterus for the same reason, and is there cherish'd and encourag'd if it meets the masculine Semen, or else expell'd if it was received into the Womb without it.

For if we may animadvert upon those things which manifestly happen in all oviparous Creatures; as also upon those which are demonstrated by our very Eyes to be in viviparous, at different times from the Coitus; lastly in those which are observed to happen in human Women, as well in a natural as preternatural State, in those with Child, and those brought to Bed being freed from the Part expulsed; then it will appear that this Modus is neither impossible nor foreign to Nature, but on the contrary, must be held universal; as salse Conceptions, Abortion, and the Fatus found in the Cavity of the Abdomen confirm.

Therefore the Masculine Semen abounding with living Animalcula, stirr'd up and moved by the greatest Force, the utmost Heat, and perhaps the vast Plenty or Abundance of Animal Spirits, fent by a violent Impetus into the Woman's Uterus, then equally turgid, hot and moving, and at the same time equally water'd with a Flux of its own Lympha and Spirits; by and by being retain'd, heated and agitated from the convulive Constriction of the Womb, running from the Egg, by a small lively Part enters incredibly thro' the then dilated Pores of the glandulous Membrane of the Egg, it is there retain'd, upported, kept warm and nourish'd, it suffocates the Animalcula that are not so lively as it self; and o Conception is made. Which Q 3

Which may be done therefore in every place, where such Semen can moisten or water the Egg; hence being pour'd thereon by Fallopius's Tube, applied to the Ovary, or meeting therewith in some Recess of that Tube, or otherwise in the very Cavity of the Womb, where-ever it can effect the same; yet it is not perhaps improbable, that the Conception is made perfectly from these brought to, and join'd with the Uterus at the same time.

The impregnated Egg is contain'd in the Womb, being that up by the Stricture of its Muscles; it Swims in a vast Plenty of abounding Humours, which being still made more liquid by Heat and Motion, they enter first of all from Impulsion by the spongy Passages adhering to one part of the Egg, distending, filling and increasing its Bulk, where again being render'd subtiler from the same Causes, they nourish the Embryo, surround, embrace and defend it against an unequal Pressure; and alfo they make the Membranes of the Egg in like manner thicker, and at the same time stretch or extend it, first in that part in which it stuck to the Ovary, so that they may there form the Rudiments or Beginning of the Placenta, which seems to be that very Receptacle of the Egg, first of all forming the Substance, which increases in Dimension almost every moment of time.

But while the very same Causes are still constantly more and more renew'd, they proceed to increase the Size of the Egg and the Embryo, and likewise the Meatus as well of the Placenta, as of the little Membranes are inlarged; the Egg begins to fill the Capacity of the Uterus with its own Bulk, to apply and joyn its Convexity to the hollow Superficies thereof, and every where to be united to the small slender Vessels, sent out and received in there, but particularly in the Place of the Placenta; by which means the Womb is extended every way round, and

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by an equal Proportion all its Vessels are inlarg'd in equal measure, receive more Humours into them, and consume the Materials of the menstrual Plethora hence in like manner from the same Proportion, by which the Passages of the Egg increase, likewise the Emunctories of the Uterus are dilated, so that the Capacity of those united to these, in course joyn the Vessels of the Ovum and the Uterus together; for the same reason the Essux of Lympha or Blood is hindred from out the Womb, and it occasions the uterine Vessels to be emptied into the distended Egg and its Ducts, and by an interchangeable Course those of the Egg into the Uterus.

And because the Fatus is now join'd by the Navel-string to the very Placenta, and determines the Humour here, from both the conveying Vessels out of the Fatus into the Placenta, but from greater Vessels bearing out of the Placenta into the Uterus, it is evident that all the Humours collected here, must be perpetually thus renovated by these ways, so

that it cannot stagnate or putrefy.

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But where this mutual Enlargement of the Inofculation swells or grows bigger, that the internal uterine Emissaries may send forth their Blood, and otherwise receive it again, then the abounding Blood contain'd in the large Arterial Uterine Veffels, brought to the Uterine Placenta, may be driven from the dilated Vessels thereof into its Structure, and fo feems to be fent to the Fætus; because an Hemorrhage happens in Abortion, Delivery, wounds in Gravitation, Child-bearing, &c. from the Separation of the Placenta; as also the spewing out of Blood in the Fætus upon the Mother's being only wounded feems to prove that; altho' they may feem to hinder the Vessels from appearing in the Cadaver, and the intire little Membrane, binding the Superficies contiguous to the Womb.

For the whole Body of the Placenta, faith Ruysch, is made up of innumerable Arteries, dispers'd round every where, as in the Cortex of the Brain, interwoven by the like Artifice with Veins, Lymphatick Bags and Vessels; then it is surrounded with a little thin Membrane, very apt to tear; it receives, according to Spigelius, Two Arteries running retrograde, and proceeding to the Navel of the Fatus, there fent in to the subcartilaginous Substance of the Navel-string, being there supported and defended, bringing back Blood from the Fatus that is not so proper for Circulation; but the Origine of the Veins is so fine, that they scarce appear at all, yet being collected together into one Trunk, is inferted into the Navel-string; this Vein entring in by the Navel, tending upwards, enters thro' the Fiffure of the middle of the forepart of the Liver, at the inferior part into the great Sinus of the Vena Porta, agreeable to Gliffon, and pours in all the Blood it carries, yet so that from the Entrance of this umbilical Vein, it is placed in the Sinus of the Vena Porta, from thence, according to the same Author, another Pipe going out from that Region into the Cava, where it is tyed to the Diaphragm, from whence it may eafily furnish Blood to the Liver or the Cava, and from thence to the Heart; from thence being distributed according to the Laws of Circulation, thro' all the Circumference of the Body.

Furthermore, the Blood pour'd in from the whole Body of the Fatus and the umbilical Vein, into the venous Sinus of Lower, entring almost at the Auricle, descends at one side into the Heart as in Adults, but at the other, it is thrown against the middle Partition betwixt the Two Auricles; in which Partition is placed an open Foramen or Hole, to which lies the membranous Part, so that its moveable Part has Communication with the Cavity of the lest

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Auricle, from whence it appears to act upon, or move the Portion of Blood from the right Auricle into the left, as long as the Lungs are not moved; or at least, in the next adjacent Parts in the Auricles, from the venous Sinus of the Cava, into the

venous Sinus of the pulmonary Vein.

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That Portion which enters the right Auricle of the Heart, is all moved by its Force into the Trunk of the pulmonary Artery, which from the Obstruction and difficult Passage thro' the Lungs, suffers a great Resistance; hence it forcibly dilates the free Trunk of the Artery; then passes in a small quantity thro' the Lungs, and going flowly thro' the Arterial Veffels is hindred from Concretion, growing bigger, and firetching out according to the Increase of the Fætus; from thence it returns from the Lungs into the Pulmonary Vein, is mix'd to the whole Mass by the Admission of the Foramen ovale, neither is it a little obstructed in its Passage by this gentle Motion of the Blood; from whence both is driven into the left Auricle, from thence into the right; but the greatest Part of the Blood of the right side of the Heart finds in the arterious fide of the pulmonick Canal, an open channel, saith Bartholin, every where equally broad from the pulmonary Artery, entring a little obliquely into the Aorta; by which therefore, all that Blood passes from the pulmonary Artery into the Aorta, being puls'd from the right Ventricle, which can easier master the Resistance of the Blood in the Aorta, than the obstructed Lungs can procure it; but the left Ventricle of the Heart driving the Blood forward, mixes with that Blood that will be shortly describ'd; therefore the Blood of the Fatus wants all the Effects or Operation of the Lungs upon the Blood, yet it acts upon it however; and so the subtil Part or Portion of the Blood of the Fatus, separated in the Vellels of the Mother's Uterus, and elaborated in the 0 4

Placenta, is constantly mix'd with the Blood of the Fætus, afterwards flowing thro' the minutest Vessels of the Body; but the thicker Part given to the umbilical Arteries, by a mechanical Necessity from the Opposition of its Course, is subdued again from the Respiration of the Mother; while in the mean time, the Obstacles have regard to the Life of the

Fætus in the Passage thro' the Placenta.

Nevertheless, there is a nutritious Lymphatick prepared in other uterine Vessels, which is made so fine and fubril, that it can be moved out of the Meatus's or narrow Ducts of the Uterus into the Pores of the Chorion, and being more nicely changed in the Vessels thereof, passes into the little Canals of the Amnios, where being further wrought or elaborated, drops into the Cavity of the Amnios, and being there drawn in at the Mouth of the Fætus, is swallowed, lodges in the Stomach, and is digefted, being acted upon by the Bile, the Pancreatick Juice, Saliva, and Intestinal Humour; it passes into the Chyle, drawn in by the chylous Ducts, and into a foft or pulpy Faces, being driven by the Motion of the Guts, even to the Sphincter of the Intestinum rectum, after Collection in the Colon and Cacum, but not evacuated, because the Strength of the Sphinster cannot master them, while there is no Action of Respiration; whence it is, that in a perfect Fatus this whole Tract of the Intestines is often full.

But fince the Saliva and Mucus in Deglutition, the Bile and other Humours by overflowing, are received in the Guts, and all fuch like, continually depose some Faces, these being added to the former matter, concur to the making thereof.

Nay the Kidneys, fays Eustachius, at this time large, and being aggregated from lesser Bodies, water the urinary Bladder by a continual dropping, filling

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of it gently by degrees, with a fmall Quantity at a time, of a fost, unacrid Urine; but the Emission of this is ftopt from passing thro' the Urethra, it being not able to overcome the Obstacle of the Sphin-Eter, except by the force of Inspiration; but where it abounds, it enters into a membranous Canal accorcording to Spigelius, always going out from the bottom of the Bladder ascending upwards, isluing from the Navel, stretch'd out with the Navel String, even to the Root of the Placenta where it ends, agreeable to Hale in the Philosophical Transactions in a particular Bladder, proper and diffinet from the Amnios and the Cherion, confifting of a Membrane finer than the other two, of an Oval Figure situated betwixt the Placenta, cover'd over with the Amnios and the Chorion, and betwixt the Chorion turn'd back upon that, and united thereto; for this Store house of Water, the Humour whereof grows more in Quantity, of a higher Colour, and approaches nearer to Urine, as the Fætus encreales in Size, and is nearer to the Birth.

Therefore where the Intestinal Faces and Urine encrease, and have not Power to be expell'd, the Quantity, Weight and Acrimony becomes troublefome to the Færus, who now turns his Head downwards into the Place, where the internal Mouth of the Uterus is placed, his Face being in the mean time towards the Os Coccyx of the Mother; the Intestines and urinary Bladder being fill'd, begin to stimulate the Fibres, to excite in them the Senle of Pain, and to produce Motion and Contraction in the abdominal Muscles and to the whole Fatus, from whence the first Disturbance is increas'd, hence it begins affiduously to struggle with all its Endeavours by turning it felf every way, to descend towards the lower Parts, and to create a Tenesmus to the Mother; hence the abdominal Muscles begin to be violently drawn together, and the Fætus to be driven downdownward into the Pelvis, and so the proper Tenefmus to be increased, from whence by the utmost Endeavours of the Mother and the Child, the internal Orifice of the Womb is dilated, at that time anointed and made lax, from the most lubricating Mucilage, the Water of the Allantoides and the Amnios is driven forward, the little Membranes are broken, and the Waters slow out, the Head is mov'd or push'd on to the Capacity of the dilated Orifice, and then by the Addition of the Mothers throws, it is excluded thro' the lubricated Places, being sollow'd by the Navel String, the Membranes and Placenta, call'd the Secundine or After-birth, and oftentimes Blood issues out with it.

These being discharg'd, the Fibres of the Womb, the Peritonaum, the Muscles of the Abdomen and the other Vessels, which were so much distended during the last Period of Gravitation, begin to contract themselves and their Vessels, especially the Uterus which as Ruysch saith, gently and by degrees contracts it self, expelling the Blood collected here, being sirst, pure, and in Quantity, then diluted and less, at length growing viscid, pale, and very little, by the Name of Lochia; which are different as to Plenty, the time of Evacuation, Colour, Smell and Consistency, as there is a different Temperament or Constitution of the Woman in Childbed, her giving of Milk, &c.

After these Parts are contracted, the Vessels being more constring'd, give a greater Resistance to the Blood sent hither, so that the third Day after Delivery, the Hypogastricks that communicate with the Breasts, begin to insuse or pour in more Blood to these dilated Parts, that were us'd to be brought to the Womb, and therefore aqueous chylous matter therewith; from whence the Vessels of the Breasts are fill'd and more distended from the same matter; hence from the Alteration of the Motion of the Hu-

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mours arises a little Fever, a swelling, Pain, Hardness and Milk in the Breasts.

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For the Breafts, faith Nuck, being fabricated in a Place at Liberty only with Fat about it, and under a Skin that is easily stretch'd or very dilatable. they receive external Arteries from the Axillaries. internal ones from the Subclavians, sent down into the Thorax or Cheft, by the Intercostals and the Sternum, going out of those Parts, joyning to the Breafts. and communicating to the Epigastricks, from whence they pass into wonderful spiral Contorsions and little Knots, and then emit small milky Pipes which uniting together grow bigger, and last they form the great broad lactiferous Vessels, ending in one strait one, by a little narrow Channel issue out in the Papilla or Nipple, yet so, that from the Arteries by the milky Vessels into the Nipple, from that by the Milky Vessels into the Arteries, there is a free. Egress and Regress; but these nervous, spongy Papilla, have many Emunctories, varying in Number. and communicating by Anastomoses or Inosculations before their Exit; from whence Suction being apply'd, the Milk comes forth, and is continually renew'd or made again, and that more in Plenty according as the Breafts are fuck'd the more.

That Milk easily passes into Whey, Cheese, Cream, and Butter, the caseous Part of which wonderfully hardens; that it does not grow hard at the Fire like the Serum of the Blood, but exhales off from the remaining Dregs, and often sours of its own accord; is sweet, white, and almost without Taste, is from the Chyle, and the oily, soft, maternal Humours mixed in the Circulation.

And hence it is plain, why Pain in the Breafts, Hardness, Tension, Elevation of the Nipple, and a dripping of Serum at Evening happen, during the Time of Gravitation? And why these are increas'd at first, Three Days after Delivery?

Then

Then whence it comes, that upon a Repulse of the Mik, the Lonchia are greater, and so on the contrary?

Likewise why Colour, Smell, Taste and the Strength of what is taken in at the Mouth, is so remar-

kable in the very Substance of the Milk?

Why does the Milk scarce flow at all naturally, but upon the first sucking leaps out with force?

Why there is Milk in the Breafts of Infants of both

Sexes, in Boys as well as Girls?

And why of all the Animal Humours Milk only naturally fours after that manner? And why it fo

eafily deposites a Cream and Cheese?

The Fætus in the very Labour, endeavouring by continued Struggle, and being expos'd to the Air, dilates its Breaft, admits in the Air, expands the Lungs to their utmost Dimension, inlarges the Vessels thereof, lessens the Resistance of them against the Blood of the Pulmonary Artery, from whence it rushes violently into the Vessels set at Liberty, flows into the Arterial Canal, and being plentiful and fwift, it runs into the Pulmonary Vein, presses the Valve of the Foramen Ovale, shuts the Foramen it self, enters with all its Quantity into the left Ventricle of the Heart, and is expell'd again, it presses the Side of the Aorta more, folds together, contracts and fhuts the Arterial Canal; hence the Blood of the right Auricle and the venous Sinus is driven into the right Ventricle, from thence it is mov'd into the Lungs, and Respiration is made as in Adults or grown Persons, the Membrane of the Foramen Ovale grows thick at the Edges thereof, the Arterial Canal is chang'd into a Ligament.

But from the binding of the Navel String, near the Skin, nothing flows by the Vein thereof, into the Liver; the Vein changes into a Ligament; then the swifter Motion of the Blood of the Vena Cava compresses the oblique venous Canal, that it

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may harden into a Ligament, and also the umbilical Arteries are consolidated.

Respiration being now perfected, the Faces being black, tough, shining like Opium, call'd Meconium is purg'd out, so likewise the urinary Bladder by the same Labour, and from tying the Urachus is evacuated by the Urethra, as in Adults.

From all which things, all these Problems are refolv'd, as first, what does the Father or Mother contribute to the begetting of their Off-spring?

What is the Cause of Barrenness in either Sex, in

the Male or Female?

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Whether from the Masculine Semen alone, a real

Man can be produced, by any Art?

Whether any Woman, from any natural Cause, without the Conversation of Man, can be fruitful?

Whether the Menstrual Blood be malignant and venomous, or endued with any Poison? Or whether it is to be esteem'd impure and a Recrement?

Whether a Woman makes any true genital Semen, like that of the Nature of Man's, that can conduce to the Production of her own like?

Whether from the Mixture of the Semen of either, Ebullition, Fermentation, or any other Action makes the Body of Man?

Whether bona fide, a certain Place proper for Con-

ception, can be affign'd?

Whether the Woman, besides Warmth and Nourishment, gives any Form to the Fætus? Whether the Force of Imagination of the breeding Woman teaches us that?

What is Fecundity?

From whence the Membranes of the Fatus take their Origin, as to matter, and as to the Cause?

From whence the Placenta? the Navel String?
And how are the Embrio and Fatus tyed to that?
Whether

Whether is the Fætus nourish'd by the Mouth, or the Navel, or by both? And with what Difference, according to the Difference of Time from the Birth?

Whether the Fatus hath all its Viscera, Vessels, and Members together? Or that it changes its Form or Figure from the first Animalcula, then to an amphibious Creature, and lastly, to an Animal having the Breath of Life in it: Or whether it breaths in the Womb, and makes use of Air?

Whether it exonerates in the Uterus? And why not? Whether the Meconium, found in the Vagina or Neck of the Womb, or fallen from thence be an Evidence of the Death of the Fatus, or otherwise what is?

Whether there can be a Superfactation, or one Conception form'd upon another? And why is it so rare, if ever?

Why have Twins if there be three or four of them but one Placenta, as it appears they are tyed to, and yet every one possess proper or distinct Navel Strings, and Membranes? Whether because the little Eggs are each united only to one Cup or Stalk? Or whether that is always and in every Place found true?

From whence comes the nauseating in a Woman with Child, Pukings, Vomitings, Faintings, Horrors, debauch'd Appetite, Hardness of the Breasts, Pain, Swelling, Wasting, Retension of the Menstrua, Short Breath, Cough, Varices, or an Enlargement of the Veins of the Feet, Legs, Thighs and Belly?

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ΠΑΘΟΛΟΓΙ'A or Pathology.

The Nature of a Disease.

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I Itherto hath been declared and explain'd, from the Indication of their Causes, the Actions and Principles that are exercis'd in the human Body. by the Motion of the Humours in their proper Veffels, and the Resistance the Vessels give to those Humours, being call'd by a known Term Functions; and these us'd to be distinguish'd into Vital, Natural and Animal; the Vital Functions are those which make Life, so that it cannot want them; these are the musculous Actions of the Heart; the fecretory Action of the Cerebellum, the Action of the Lungs and Blood, and the Circulation of the Spirits thro' those Organs, the Arteries, Veins and Nerves; from whence 'tis plain, that these in their Perfection may encrease or lessen much, and yet Life remain still: The Natural Functions are those which change or alter the Things fo, which are received into the Body, that they pass into our own Nature, or become Part of our selves, which are the Actions of the Viscera, Vessels and Humours, receiving, retaining, moving, changing, mixing, fecerning, applying, excerning or carrying out, and confuming what is brought unto them, which also may be convey'd in divers Parts: The Animal Functions are those which happen so in Man, that either human Intellect conceives Ideas of the fame Nature from thence, which are united to the Corporeal Action, or the Will is moved from these excited Actions; such are the Taste, the Touch, the Smell, the Sight, and the Hearing, Perception, Imagination, Memory, Judgment, Reasoning, the Affections of the Mind, voluntary Motions; in all which is also a great variety of Degrees. From hence may be physically understood, what Life properly is, how long it lasts, in what Things it accurately consists, what it may want, and yet be able notwithstanding to continue; hence also Health is understood to be a Faculty of the Body, apt or perfectly sit for the Exercise or Performance of all its Actions. Lastly, It appoints all the Essects of those Actions, to determinate Motions and the Unalterableness of the Things taking into the

Body.

The State of the Living Body taking away, or disabling the Faculty from the Performance of any Action, is call'd a Disease; the Idea of which is the Possibility of the Absence of something requisite to the Exercise of the Action, or the Performance of something present, that is repugnant to the same: Neither is the mention made of the Mind in this Definition; because the State of the Mind individually attends or accompanies the determinate State of the Body; and because Medicine acting upon the Body only, Habit or Custom restores the Conditions of the Mind; as also because the alter'd Condition of the Mind, neither produces good nor harm, to the State of Health, except it arises from some corporeal Essect.

He therefore that wou'd perfectly understand all the intellectual Conditions requisite to Actions, he may plainly see the Defect of the Condition from the Knowledge of the Disease, and again we'll take the Nature of the Disease from thence, necessarily following from the Knowledge of the Defect: which is call'd Pathology, and is divided into its pro-

per Parts.

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Herefore as well as Actions, so Diseases may be distinguish'd, as the Conditions to Actions, and also the Desects of them: Hence 1st, Diseases of a simple, solid, or organick Part. Secondly, Diseases of the Humours, regarding their Nature, Quantity and Accidents. Thirdly, Diseases compos'd from both these, which are human, and that Male or Female which relates to Men and Women; to all which Classes we shall proceed in a Compendium.

Similar Difeases.

A Disease of the most simple solid Part, call'd Similar, properly in the first Place, obtains in the last or extremest Fibre; which since it is a Body merely terrestrial, sine, simple, nervous, or else arising from Nerves, made up of the most subtil earthy Parts, connected by a certain Strength, it is subject to Diseases of too much force, too great Weakness, Contraction, Relaxation, or Solution of Unity: The first Four have always a certain Reason from the Symetry of their Body; hence there is a salubrious Difference to one, and oftentimes a morbid one to another.

The same Disease together with its Differences obtains. 2ly, In the minutest Membrane made from Fibres of the like Nature, being joyn'd or interwoven together: And 3ly, In the smallest nervous Canals, constituted from a hollow cylindrick Concretion of such a Membrane. 4ly, In a Membrane made up of such little Canals, executing the Office of the Fibres. 5ly, In Canals form'd from such a compounded Membrane, which are all the larger Vessels

Vessels of the Body, only differing in a different degree of Composition: 6ly, In those solid Parts which consist of Canals, destitute or void of any distending Humour, or which from a gross one, together with a proper coercing and concreted Vessel, changes as it were into a particular thick Part: For if the Diseases attending all these separately were examined, they wou'd be found to be such as will be hereaster describ'd.

Likewise in these Parts that were once healthful or sound, Diseases may arise of an ill Structure or Conformation, if the smallest Solids nourish amis, or are ill apply'd, and indeed Particles added to the Substance, Figure or Solidity of a Body may grow wrong; but a sickly Contrariety seems again to have only these Diseases as are now describ'd.

Organick Diseases.

DUT where a certain Part of the Body compounded of innumerable Parts, performs an Action from the Motion of the Fluids, which should be done by the Function of its Instrument, or any other Office from the Strength of its Conformation, then it may be regarded in it self, as a solid Part, or as to the Humour contain'd therein: If the first is allow'd, then the Diseases call'd Organick, are most aptly examined under these four Classes.

First, The Violation or Injury of the Figure, either in the internal or external Superficies, as also in Accidents of either, as to Roughness, Smoothness, Straitness or Crookedness, Laxity, Density, Cavity, Solidity, which are call'd Diseases of an ill

Conformation.

2ly, As to Numbers in Excess or Defect. 3ly, Increase or Diminution of Size. fere fere Diff F mal

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But the Superficies it self being first sound, but afterwards hurt or broken, consists either in the different Union of the compounding Part, or in the Diseases of the Humours offending there.

Forasmuch as the Superficies forms Cavities, that make Passages, Sinusses, Receptacles, it may offend or transgress in Number, from whence sometimes Difeases are either from the extraordinary, large or

If the Natural Capacity of the Cavity encreases too much, or a new one be formed, there arises a threefold Mischief or Inconvenience, which is call'd avas haves, frank nois, frageois,: In the first, the Mouths of the dilated Cavity, emit what is retain'd in them: In the next, the Parts constituting the Membranes are so divided, that the Interstitia gape so wide, as to let what shou'd be contain'd there quite through: In the last place, there happens a true Separation of the cohering Parts; from whence these Species of Diseases deserve to be remembred, frequently ending in one Diaresis, and sometimes restoring themselves; but these are best explain'd from Mechanicks.

The Strength or Force of the Fluid encreasing, the Vessel is too much enlarg'd as to its Capacity, and forms Diseases which are injurious and offend in secerning, excerning and casting the matter through.

In lessening of the Cavity, there is supposed to be five several Species; first, the *\(\text{upen}\); or Stoppage of the Cavity, by a viscid, thick, grumous, inflammatory, calculous, sandy, parulent, adipous matter, thutting inwardly the very Cavities of the Vessels. 2ly, servoxwer, or a Narrowness of the Passage, when a Tumour rising in the proper Substance of the Membrane, constituting the Cavitty, binds up and stops the Meature. 3ly, \$\frac{3}{2}\frac{1}

moving sides, when some external Cause squeezes the Membranes too and again to the Vessels, it lessens its Cavity by degrees, and at last persectly takes it away. 4ly, our out, When the Sides of the Cavities forming either to the Thlipsis or the Emphranis, so entirely coalesce, that the whole inward Capacity is lost. 5ly, our coast, From which they are call'd empty Vessels, having their sides falling together, from the large Distension of their Tone by some morbid matter; and to this we may refer the too great Contraction of the Vessels, by a force that exceeds the Strength of their Orbicular Fibres.

But an organick Part rarely errs as a Disease, in exceeding the Number; except from thence, a wounded Action follows; but often labours from a Desect that ought to be number'd or reckon'd as

a Disease.

But a morbid Size in an Organick Part, is frequently reckon'd as such, which also is faulty as well in Excess as Defect. The first, comprehends Tumours, impraexious, Nodes, Tophes, Exostoses; and this may be often assign'd to the Narrowness of the Cavity about the strait Ends, and the Dilatation in the middle, or to the nanouvalar, includes to straight the required Size of the Part is lessen'd in Action; and the Conception thereof is consistent in the Atrophy, and Phibisis, a Wasting, Consumption and Mutilation of the Part.

Lastly, a Disease of the Organical Part consists of an ill Composition with other Parts; which is lodg'd in the Situation and Connexion, in which the Motion or Want of Motion of the Part is contain'd: To this Disease therefore belongs the broken Figure of the Parts knit together, the too great shortning of the united Ligaments; the faulty Elongation of them, their Laxity or Rigidness; at last a Lif-

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are useful to the Understanding thereof, and their various Distinctions. Umbilical Hernia's, and such as are in the Groin and Scrotum in Men; femoral Hernia's in Women, as likewise those of the Caul, Intestines, Air and Water; the Falling down or the Descent of the Womb and strait Gut, the starting out of the Muscles and Tendons from their proper Places; the Loosness or Rupture of the Membranes, Bands, that retain the Joynts or Bones in their due

Situations, are very pertinent Diseases in this Place, the Understanding of which are highly necessary in the general Design of Medicine.

And there is a Disease common to the solid Part, that is simple as well as organical: Which is simply call'd Solution of Continuity, if made in a simple Part; but if in an Organick a compounded one, it is variously denominated, from the Nature of the Part, the Diversity of the Cause, and Difference of the Application: To this relates Wounds, Fisures, Punctures, Contusions, Ulcers, Corrosions, Dilacerations, Ruptures, Fractures, Exfoliations, Caries of the Bones, a Spina Ventosa, &c.

The Diseases of the Fluids or Humors.

That the Diseases of the Fluids may be rightly understood from hence, and digested into an exact Order, we are to know the Functions requisite in them, or those Things which are universally necessary to every distinct Liquor; or else the particular ones adapted to the human Species, or lastly,

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those secret ones, which constitute the Nature or Disposition of each particular Man. The Universals are such as make up the Minuteness of Parts, which escape the naked Sense, so small an Endeavour on a mutual Contact, as scarcely can be exceeded in the minutest sensible force, that Lubricity of the Superficies, that scarce amount to a Change or Alteration amongst each other: But in Respect of human Nature there are many Things happen, that have different Functions, from whence arise many different Diseases.

All which Diseases may yet be easily reduced to a Vice in Quantity or Quality, if the Fluids are re-

garded in themselves.

But if they are confider'd as they are coerced in the definite Solids, then they are found to err first of

all in Place or Proportion.

That Abundance or Quantity of good Humour which hurts the Functions, is call'd a mandage, which is understood in a good Sense of the chylous matter, or that call'd Hamatopoiesis, which flows together with the slender Expense of what is exhal'd, these are describ'd as to what is made by the Vessels or their Strength.

That Scarcity of good Humour, which injures the Functions is rarely to be met with, except some external Force suddenly produces it, when there is an ill Disposition or Temperament of the other Jui-

ces in the Fluids.

That Quality of the Humours which hurts the Functions, is call'd κακοκυμία or a Cachochymia, a depraved Habit, which is resident in the Fluids, as they regard the compounding Parts, together with the Mass of Fluids, or considered with the whole Substance of the Fluid together, as a Part concurring to make up the human Body.

If the morbid Disposition be consider'd in every particular Particle of the Humour, that will be fix'd

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The Diseases of the Fluids or Humors. 215 either in the encreas'd or lessen'd Substance, or in the greater or lesser Solidity of the Particle; or it will consist in the Figure, as well in its Rigidness, Flexibility or Elasticity, various Cohesion, or lastly, in its Divisibility.

The Idea of the increas'd Substance in the Parts of the Humours, shows by the Unpassableness of them an iungazir, in the lesser Vessels an Atrophy, &c.

The Idea of the Substance decreasing, in the Parts of the Humours shows the Sianvolw and the nevery-

year to be too great.

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The Encrease of Solidity if conceived in the Parts of the Humour, there is to be understood too great Strength that changes the Solids as well as Fluids, and likewise that there is in the solid Parts an arasóuwois, a Siamásnois and a Siaigeois; but in the Fluids too much Attenuation and Attrition.

If the Solidity appears too much diminish'd, there is an Unactiveness to be conceived, as well in the Vessels as in the Fluids, hence comes Rest, and

foon after Cohesion.

A Particle of Humour errs from its own Figure, when receding from a sperical Nature, it takes upon it an angular acute one; hence applying its whole Motion to a small Part, it becomes acrid; these Recesses are various, but commodiously restor'd or renew'd: First, To an Acrimony meerly call'd Mechanical, where all remaining the same, the Figure only is form'd into solid acute Angles. 2ly, To an Acrimony call'd Saline, which is first, muriatic, Ammoniac, Acid, Alcalisate, Fix'd, Volatile, Simple and Compound. 3ly, To an oleous one, which is that of Oil attenuated into Spirits or Oil, as it were burnt, by too much Attrition, of a Saline Oil, an Earthy Oil, an Acrid one, as compos'd of the burnt, saline and terrestrial together, 4ly, To a saponaceous Acrimony, such as is to be found in the poi-Ionous Parts of Animals and Vegetables. P 4

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the Acrimony compounded of the four preceding ones, as also that which arises from the eating of Acrid Things, as from Vitriols and Metallick Bodies.

But that Disease is very grievous, and the Humour scarce curable, if the Particles thereof are so rigid, that they cannot be master'd or overcome by the Strength of the human Body, neither can they be divided or sigurated into little proper Parts. But the same being too changeable in their Figures are morbid; for by the Evenness of their Superficies, they grow together by increasing their Contacts.

And a Disease is as observable in the too elastick Parts of our Fluids, because that constantly changes all the Compages of the Humours too much, upon the least Change of Heat or compressive Motion.

Nay too firm a Cohesion of Substance in every Particle is ill; for so it hinders the Production of the lesser small Substances out of the greater, which are yet so necessary to a perfect State of Life: On the contrary, too easie a Divisibility is hurtful; for that is repugnant to the Constancy of Health and Life.

And thus it is that Diseases are of the greatest moment in the Science of Physick, and the understanding the Basis thereof, the best Pathology: Yet they can scarce be understood, except from an accurate Observation of their Essects, which may be made in sick Bodies; from whence it is plain we can best see the morbid Idiosyncracy of the Humours.

But if you will behold all the Humours together, you may find the Diseases of them to be particularly, either too great Fluidity, or too great Thickness, the first passing with too great Motion thro' the Vessels, or the latter too inclinable to Rest; or else lastly, some Disease composed of Vices already enumerated.

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The Diseases of the Fluids or Humors. 217

And there are notable Diseases that arise from the fame continued Humours; but are render'd morbid only from the Change of Place; of which there are Two Classes: First, If the Diameters be too much increas'd in the Vessels, the grosser Humours are received in straiter Channels, which by degrees grow 2ly, If the Veffels by any means be narrower. broke, the Humours issue out, and are collected in the Interstitia, made from their Distension into the folid Parts of the Body; from whence we may understand the Rise of Inflamations, true or bastard Aneurisms, and Enchymoses, &c. as also Oedema's, Pustules, Dropsies of the Head, Breast, Belly, Womb, Ovaries, Testes, Scrotum, Peritonaum, and thro' the Habit of the whole Body, from a peccant or vitious Lympha; as likewise an Emphysema from the Air.

But these stagnant Humours, collected and affused, putresying by Heat and Rest, grow purulent, ichorous, corroding and acrid; they destroy the young tender yet solid Stamina, from whence they make Sinus's, Fistula's, Ulcers, Gangreens, Cancers,

and the like.

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But these are the primary Differences of Diseases, taken from the very Nature of them, which, tho they are so fertile in producing the greatest Share of other Diseases, they scarce deserve to be num-

ber'd amongst the Causes of Diseases.

But it hath obtain'd its Use among Physicians, that besides they distinguish Diseases from some external Accidents, which the they are common to many very different ones, yet have their Distinctions, and a celebrated Use in Physick, the they are too much multiply'd with subtil Division; therefore the following particularly have lest out several.

First, by reason of the Cause they are is nordena, auundena, negrondena, seviseonalena, hereditary, conate and acquired.

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Secondly, By reason of the Subject, they are Discases of Age, as of Infants, Youth, Adults, old People, Diseases of the Sexes Male and Female, of Virgins, Women, with Child, Parents and Nurses;

then fuch as are universal and particular.

Thirdly, By reason of Time, the acutest Diseases are fuch as terminate within Four Days; the peracute within Seven; the acute within Twenty Days; all the rest are chronick; whereof some are vernal or autumnal, continual or without Intermiffion, moderate or temperate and intermittent.

Fourthly, By reason of their Effects; salubrious, benign, malign, curable, incurable, mortal and con-

tagious.

Fifthly, By reason of the Condition or State of the Disease, its Beginning, Progress, Extremity, Decrease and End.

ΑΙΤΙΟΛΟΓΙ Α ΠΑΘΟΛΟΓΙΚΗ Σ; Or, Pathological Aitiology.

THE Cause of a Disease is call'd that which makes the Disease Present, and is scarcely always real; or it really produces a new State in the Solids and Fluids, which is the Disease it self; or it takes away that which is altogether requisite for the Exercise of its Function.

If that pre-exists any-how in the Body before the Effect produced, it is called internal; but if existing without the Body, from thence apply'd to it,

it produces a Disease call'd external.

The internal ones frequently hurt the Humours first of all, then the solid Parts; the external ones chiefly affect the Solids first, and after that the Fluids; except by chance some few poisonous and contagious Diseases.

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The proximate or nearest Cause of a Disease is call'd all that together, which makes up the whole immediately present; this is always intire, persect and sufficient for the Distemper, whether simple or compound: This being present, plants and continues the Disease, but absent, it is removed; but is almost the same Ens or Being existing in the whole, and is chiefly necessary in the most useful Enquiry.

The remote or distant Cause of a Disease, is call'd that which so changes the Body, that it makes it sit to receive the Disease, if any else be added to it; therefore it is not at any time perfect, or sufficient to produce any Disease of it self; neither can that Addition to it alone effect it, but both together; therefore Medicine directs, that both shou'd be eradicated at the same time: Both these united make the proximate Cause.

The remote Cause inherent to the Body, is call'd resnyeasin, or a Disposition before-hand; as for example, a Temperament or Constitution of Body as to hot or cold, Plethora or Cacochymia; a vast Abun-

dance, or Depravity of the Fluids.

The Cause which approaches, or is added to the remote, excites that so, that they make a Disease together, call'd the Procatartick, or rejeases, by some the Occasion; it is injurious by Pre-dispositions only as it makes such a Disease; sometimes it is internal, sometimes external.

These latter the most commodious of all and most apt to assist the Memory, may be reduced to

Four Classes chiefly useful, which are,

First, The things received or convey'd into the Body; Air, Meat, Drink, Medicine, Poison, which are introduced by the Spiracles of the Skin and Nostrils; by the Passages of the Mouth, Lungs, Gullet, Stomach, Intestines or Pudenda; from a visible or invisible Species, from a Fume or Vapour, a Draught, Clyster, and what is infus'd into the Body.

Secondly, Gestures; the Motion of the whole Body or a Part, and the Affections of the Mind; Rest of both kinds whether sleeping or waking.

Thirdly, The things retain'd; Excretions whether falubrious, or Recrements whether they be

morbid.

Fourthly, External Applications to the Body; as Air, Vapours, Fomentations, Baths, Cloathing, Liniments, Ointments, Emplaisters, Wounds, Brui-

fes, 'Causticks.

Which are otherwise divided into Six Classes, under the Title of the Six Non-naturals; Air, Meat and Drink, Motion and Rest, the Affections of the Mind, Retentions and Excretions, Sleep and Waking; enjoying this Name, because by the Use or Abuse of them, they may be made naturally good, or unnaturally bad: They may be reduced under these Heads, but it will be more convenient and proper

to make use of the precedent Division.

The Air, when too hot, diffipates the Moisture of the Eyes, Nostrils, Mouth and Aspera Arteria, there it dries up the Vessels; it thickens the Blood in the Lungs; from either of which Causes it hinders their Actions, exciting many Diseases that arise from thence; it carries off the external Humours that are always thinner, and exhales the Residue within; it diffipates the more agile Parts, and collects together the flower, which it unites and dries; therefore it daily leffens the aqueous, spirituous, volatile, saline Parts, but on the contrary, increases the fix'd, saline, oily, gross, tenacious, acrid, earthy ones, which it accumulates and unites together into indiffolveable Maffes; hence comes the Impassableness of the Humours, together with the Weakness of the Solids, and what follows from thence, to wit, Obstructions, Dryness, Inflamations, Stoppage of Digestion, Putrefaction, Costiveness, Thirst, Strangury, red Urine, yellow Jaundice, acute

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So, the V Tum acute, hot and dry Diseases; and first of all, these Actions principally injure the Lymphaticks, and the

Genus nervolum.

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A cold Air shortens, thickens and strengthens the folid Fibres, hence their Actions increase the Fluids: but where they thaw again, it destroys and disfolves the Fibres; the same cold or chilling Air, binds and thickens the Humours, dries and straitens the Lungs, coagulates the pulmonary Blood, from whence come Obstructions, Inflamations, Difficulty of Breathing, Coughs, Catarrhs, Mucus, Pus, Gangreens; but if the Body is mov'd strongly together, then the Action of the Solid, is so increas'd into Fluids, and that of Humours into Liquids, that it makes the greatest Attenuation, Perspiration, Voraciousness, Weakness, Fainting of the Spirits and sudden Death; if on the contrary, Rest, and the utmost Coldness in the Air brings on Stupidity or Numbness, excessive Pains in the Limbs, and the Scurvy to the last degree.

If the same Air be too moist, it relaxes, dissolves and weakens the Fibres, and first the pulmonary ones; retains the Serum in the Lungs, increases and gathers it together, hindring Perspiration therein; from whence come Coughs, Peripneumonia's, Diarrhoea's, Sleepiness and Fevers; if great Heat be join'd to it, sudden Putresaction, if great Cold, a serous Flux

of Rheum.

A dry Air produces almost the same Essects, with too great Heat, the Air being too heavy, compresses all the Canals and Fluids of the whole Body, but especially in the Lungs, from whence it gives too great Resistance to the Heart, suffocates the Motion of the Humours, and kills.

So, if it be too light, it dilates by a less Pressure the Vessels, and rarefies the Humours; hence come Tumours and Eruptions of the Humours which create Diseases; then the contractile Force prevails; the Dilatation is resisted and overcome in the Pulmonick Fibres; whence Respiration is stopt, the Blood is there accumulated, there is an acute Peri-

pneumonia and Death it felf.

The Heaven, the Season of the Year, the Earth, Sea, Mountains, Lakes, Fens, Rivers, Vapours, Exhalations, Meteors, give such a Change to the Air, that it creates various Diseases, not depending so much on the Disposition of the Air, and of its Functions and Qualities, as on the Nature and Essicacy of the Mixture; from whence therefore they ought

to be inquired into and understood.

But Winds act upon our Bodies, either by their Motion, or as they convey to us some Qualities of the Air; it is impossible to tell those things of em, that will quadrate with every Season and Climate, but the chorographical Knowledge of a Place, the Neighbourhood of adjacent Parts of which is seen by us, compar'd with the Seasons of the Year, may afford us something real and advantagious; in like manner from a certain successive Series of what follows, we have often remarkable Effects; for first they act as hot, cold, moist or dry; hence they alter the Solids and Fluids.

Meat and Drink may offend in the Production of Diseases, either in Quantity or Quality; if they act amis in Quantity, they effect this in excess or de-

fect.

If they offend in too great Plenty, the Stomach is too much extended, hence arises a Convulsion from closing the Orifice thereof, its Vessels are compress'd, Dilution, Digestion, Contrition, Separation and Expulsion are hindred; from whence come Dyspnoea's, a perverse Circulation of Humours, Crudities, Ructations, Nauseating, Heartburn, Vomiting, Putresaction, Vertigo, Consuson of the Senses, a Cachexy,

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chexy, all which Vices being once rais'd, are hard-

ly corrected in the following Functions.

But if it be defective from an absolute Want, which is indeed a mere Defect, it produces nothing of it self, but then in the interim of time, they waste and destroy the solid Parts of the Body that maintain the Actions of Life, they dissipate the subtil fine Fluids, and inspissate or thicken the remainder; by a constant repeated Attrition they dissolve the Oils and Salts, extricating the volatile acrid Parts that corrode the minute and tender Vessels, putrefy the Humours, pollute the Breath, hence comes a saline Spume, which is acrid, bilious and putrid in the Stomach first, and then in the Intestines; Ructations or Belchings, Loathings, Faintness, an outragious or devouring, and afterwards a Dejection or intire Loss thereof, unquenchable Thirst, Dryness, Weakness, Gripes, Plenty of Gall, Vomitings, Leanness, Watchings, Epilepsies, violent Fevers and Death.

From whence it is evident, that too much Abstinence creates worse Diseases than too much Repletion, and the Vices of the sormer are much more difficult to cure, than those of the latter, agreeable

to Hippocrates.

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But those Vices which lodge in the ill quality of Meat and Drink; may commodiously be apply'd to Acrimony, Viscidity or Oilines: The Acrimony of the Meat and Drink is first saline, but this is muriatic, naturally acid or fermenting; the first raises Thirst, Hoarseness, Roughness, Dryness, Rigidness, an Acrimony especially in the serous Humours, a like Dissolution of the Fluids, an Unaptness of the serous Lympha to Nutrition, a Destruction of the minutest Solids, corroding Pangs, and Scurvy. The other which is a simple Acid, or for the most part sour, astringes, incrasates, coagulates, first of all creating an acid Acrimony, excruciating

Pains, Heart-burn, Paleness and Scabs; which more particularly lodges in Summer Fruits that are not fully ripe. Lastly, the third is in acid Wines or Vinegars, which produces the like Mischiess, but not so grievous; from hence by the too frequent Use of these things, an acrid acid Serum is produced, the consequence of which are Rheumatisms and Gouts.

In the second place, there is an acrimony in Meat and Drink which is aromatick, as chiefly consisting of Salt and Oil united with Acrids; this makes Thirst, Dryness, Heat, Burning, stimulating the Solids, and giving a swift Motion to the Fluids; hence come Heart-burning, Heat of the Stomach, Loathing, Belching, Vomiting, Fevers, Wasting, Contractions, and other Diseases depending thereon.

The Third is an acrimony prepared from a spirituous Fermentation, increased by time, being raifed by Distillation to the highest degree, as that in Wine, old Beer and distill'd Spirits; this produces Thirst, Drunkenness, a dry Constriction of the Fibres, a Goagulation of the Humours scarce resolvable, the quickest Stimulum and sudden Loss of the solid Parts; hence there is the greatest necessity of pouring on the like fort of Liquor, from whence arise Weakness, Flatus or Wind, Obstructions, Fevers, Tumours, Dropsies, a Leucophlegmatia, and the like Evils.

Lastly, in the fourth place is found, a penetrating fermenting Acrimony, which is in the Crude Must of Summer Fruits, in Wine or Malt Drink, but in the very Act of Fermentation, by shutting the Vessel close is soon suppress'd; this creates Rucations, Wind, Spasms or Contractions of the Stomach and Guts, Vomitings, Cholicks, Diarrhea's, Dysenteries, Iliack Passions and the like.

But too great Viscidity of Meat from unfermented Flower, or from the Gelly of Animals, as well as from tough Cheese and hard Curd, generates a Weight Weight ctions come Swelli as also Blood Obstructold,

But weak: little aqueou mours, from bitter of Thirft,

the Vife Too any pa and rec likewif Fluids ved ; t icatter' ged int while, tenuate it were nacious as it w the Bile are fill'd made; Suppura Death. or one l Viscera,

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Weight in the Stomach, Wind, Crudities, Obstructions of the smaller Vessels in the Intestines, hence come an Unactiveness of the Guts to Motion, a Swelling and Hardness of the Belly being bound, as also from the same cause a viscous quality in the Blood from the united glewy Particles thereof, hence Obstructions at the Glands, Paleness, Sluggishness, Cold, Tumours.

But too much Oiliness, lubricates, relaxes and weakens the Solids; obstructs the Mouths of the little Vessels; hence it hinders the Passage of the aqueous Fluid, depraves the Mixture of the Humours, excites or raises the burning nitrous Acrids; from which proceed Ructations, Loathings, and bitter oily Vomitings; then it occasions exceeding Thirst, Obstructions, Inslamations, Indigestions of the Viscera, and many Mischiess arising from thence.

Too much Motion throughout the Body, or in any particular Part, always increases Contractions, and reciprocal Relaxations of the muscular Villa, and likewise a Celerity in all the Humours; hence the Fluids and Solids by too much Attrition are disfolved; the aqueous, spirituous moveable Parts are scatter'd or dispers'd; the residuary Humours changed into an inflamatory Thickness; in the mean while, the Oils and Salts being too much attenuated, ground, made volatile and acrid, are as it were exalted into Corruption; the gross and tenacious Oils are accumulated; the Humours are as it were burnt or set on Fire, especially that of the Bile, the Marrow is confumed; the little Cells are fill'd with Ichor, a Leanness or Consumption is made; hence Weariness, Pain, Inflamation, Fever, Suppuration, Gangreen, a Hemorrhage and sudden Death. But if this happen in a Cachochymick Body. or one labouring under a Confumption of any of the Viscera, and especially if in the Height of Summer, it is quickly mortal. T60 Too much Waking consumes the Spirits, so that they are to be repair'd by no Art, but Sleep; it dries up the rest, grinds the Solids, especially those fine ones of the Brain, increases the Acrimony, hinders Concoction and Nutrition, exasperates the Bile; hence there is a Production of Fevers, Delirium, &c. Generation of Melancholy, Agitation, Evacuation, Sadness, a deprav'd Imagination and perpetual Inquietude.

Too much Rest of the Muscles throughout the whole Body, or in a single Part, renders the muscular Fibres unsit for Motion, lessens the Celerity in all the Fluids; hence comes Concretion Unactiveness as well of the Fluids, as of the Principles that constitute them; a Repletion of the Cells, a Collection of Marrow, Fatness, Leucophlegmatia, Coldness, Sleepiness, Slowness; from whence are known the Effects of Idleness, and a sedentary Life.

Too much Sleep consumes the volatile Parts, and by degrees thickens the Rest; it collects those things into the lateral Vessels, and scarce moves them; it retards the Excrements, it loads the Brain, fills the Head, and dulls or stupisties the Senses; hence it becomes hurtful to those who are inclinable to it, beyond others, and is advantagious to such as are addicted to Waking.

The Affections of the Mind that are violent or continue long, wonderfully and forcibly change and deprave the Brain, Nerves, Spirits and Muscles, from whence they are capable of producing almost all sorts of Diseases, and supporting or maintaining the Strength of them, according to their Diversity and Duration.

Too large an Excretion of Saliva disturbs the first Concoction, and after that the following; it procures Thirst, Dryness, Melancholy, Consumption and Atrophia; but if it is not excern'd into the Mouth, or much less than usual, then it hinders the Man-

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Manducation of the Victuals, Tasting, Swallowing,

Digestion, and likewise increases Thirst.

Too large an Excretion of Bile or Gall by the fuperior or inferior Parts, destroys the making of Chyle in the first Instruments; hence it hinders the Concoction of Victuals, the Secretion and Excretion of Fæces; produces an acid Temperament, Cold, Weakness, a Leucophlegmatia, Fainting; but if it stops what is made from flowing into the Cavity of the Intestine, creates yellow Jaundice, together

with the foregoing Vices.

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The Lympha of the Pancreas and Intestines, if too much of it be driven into the Guts, produces the like Mischiefs as when the Saliva is faulty in like manner; as also serous Diarrhæa's at fiest, from whence proceed the greatest Weaknesses, Faintings of the Spirits, Dryness, Thirst, Hectick Fevers, and a Marasmus. If it flows not into the Intestines, or that very flowly, then it makes thick and compact Substances in the Guts; hence come Weight, Repletion, Gripes, Twifting of the Guts, Thirst, Fe-

ver, hard Stools, Tumors, &c.

Too plentiful an Excretion of Blood; whether it be made by Anastomosis from the Liver, Intestines, Kidneys or Womb, or by a Diairesis, Diapesis or Wounds; it takes away the Strength, finks the Spirits, destroys all Actions, accumulates crude, wat ry, cold Humours; produces a Leucophlegmatia, Dropfy, a Relaxation in all the Vessels, and an Enlargement of the Arteries: But the Blood by the Hemorrhoidal Vessels or the natural Courses of Women, or other accustom'd Places that formerly us'd to flow periodically or otherwise, being now intercepted, makes topical and dire Inflamations, Suffocations and Stoppage of Circulation, Fevers, wonderful and various kinds of Diseases; but especially very strange Hemorrhagies in other Places.

Too large an Excretion of the Semen produces Lassicude, Weakness, Inability to Motion, Convulsions, Leanness, Dryness, Pains in the Membranes of the Brain, Heat, especially of the Eyes, Dulness, Consumption in the Back, Foolishness, and several

other Diseases bordering on these.

A Superfluity of Urine makes Dryness, stops the Passage of the Humours, produces Heat, unquenchable Thirst, Crudities, a Subduction or Lowness of Spirits, Leanness, Atrophy, and the like Mischiess; and too much Sweat effects almost the same thing; but a Suppression of Urine weakens the Bladder, Ureters and Pelvis of the Kidneys, and intirely destroying their Texture by distending, corroding and putresying the same, it forms an alcalisate Acrimony throughout the whole Lympha of the Blood; hence by injuring the tender Stamina of the Brain, it brings on Sorrow, Heaviness, troublesome Sleep, Vertigo's, Apoplexies, &c.

Too great abundance of Sanctorius's Perspiration makes the greatest Weaknesses, hence arises a Deliquium or Fainting, and at last sudden Death; but if this be very slow or suppress'd, it makes the Vessels of the outward Skin dry and wither, hence proceeds Obstructions of the larger Secretions; the Circulation is alter'd, the acrid Parts are there retain'd, from whence arise Putresaction, Crudity,

Fevers, Inflamations and Apostems.

Cold Externals being apply'd, shut the Meaturis or Passages, and contract the Fibres, driving back what was retain'd there and hinder their Exhalation, by which means they essect what the impeded Perspiration had occasion'd. Moist or humid things wash the Excrements, open the Mouths of the Vessels and relax them, inviting the Humours to the outward Parts, whence if they exceed they produce the same Diseases, as too much Sweat: Dry things act the contrary way; whence we may understand

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derstand the Use of Baths, Fomentations, Epithimums and the like, if we first know the Matter, Quality, Modus and Time of Application.

There are several internal things so general to the Body, that many Diseases depend on them as their Causes; from whence they are proposed in the general Enumeration of Causes, and are wont to be explain'd by their Causes; and these are a Plethora, Cacochymia and internal heterogeneous Matters.

A Plethora is made, supported and increas'd in the Body, whose Viscera are capable of making plenty of Chyle, whose sanguiferous Vessels are lax, and who eat Victuals of good Nourishment, are of a middle Age, of a fanguine Constitution, whose Minds are unemploy'd, and who enjoy a competent share of Rest. This produces intolerable Heat and Motion, an Extension of the larger Vessels, and a Compression of the lesser; hence upon the least occasion given, there is a Laceration of the Vessels, a Suffocation of the Liquids, and a lazy or floathful Unactivity.

A Pletbora may be consider'd, either in those things which happen to the Humours extriniecally, or in those which adhere internally in them, and then again, either in all together, or in any par-

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Therefore where it happens, that there is first too great a Motion of the Humours thro' the Vellels, that make a Compression, Attrition, Attenuation, Heat and an inflamatory Diathefis of the Humours; and consequently the same Diseases as have been already explain'd from too much mulcular Motion: But the Motion being too flow, produces the direct contrary. First of all there is a dangerous Motion, either from the excels or want of the nervous Spirits, from whence all Concoctions,

Secretions and Excretions are hurt, and from thence are produced Difeases almost of all kinds.

But too great a Fluidity of the Humours, produces too much Exhalation or Expence, Consumption, a disturb'd Secretion, a Constriction of the larger Vessels, Emptiness and Weakness of the same; Obstructions, Ruptures, and Suppurations in the lesser; which are hurtful in the first place, if too great Acrimony and Motion attend together.

But too great Tenacity of the Humours brings forth Obstructions, Extension of the Vessels, Pains and Tumors, first at the Glands, and then at the Arterial Unions: But where an Acrimony is likewise join'd to that Tenacity, then according to the different proportion, with which these Two meet together, there is chiefly made a Destruction of the Vessels, from whence the Humour being pour'd out, there follows Pustules, Inslammations, Gangreens, Cancers, Itching, Ulcers, a Caries and the like.

Crude, acid Humours, sour, vinous, fermenting Acids, chylous and milky ones, together with volatile and fix'd Alcalies, also muriatic, armoniac Salts, the saline, oleous aromatick Acrids, produces the like Diseases as proceed from the Vice of the Aliment, which always contain some of these Princi-

ples therein.

A yellow Bile, like the Yolk of an Egg, being often rais'd by its own Motion, from a Convulsion, a Disturbance of the Mind, or from some other Cause scarce yet discover'd or explain'd, produces many and those grievous Diseases, as Loathing or Abhorrence of Food, Grief, Hiccups, Heart-burns, Iliack Pains, Colicks, Gripes, Wind, Irrustations, or Belchings, Diarrhæa's, Dysenteries, acute Diseases, Fevers and Convulsions.

But black or melancholy Bile call'd so from its Colour, and nam'd Bile from its Situation where it is collected, and from whence it is secern'd; being some-

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fometimes of the Taste of the sharpest Vinegar, but fometimes like that of putrefied Blood, it corrodes, burns and scours, exciting Inflammations, Gangreens, Sphacelus's, the most afflicting and bitter Pains with enormous Effervescencies; three forts of which are describ'd in the Causes of Diseases, the first is from the mildest or best Substance of the Blood, too much agitated or put into too violent a Motion: The Second is from this first matter being more and more exasperated by the same Causes: The Third is from a corrupted or putrefied Bile, which if it arise from the yellow, yolky, eruginous Gall, it is always the worst, and that according to the variety of its Disposition, and the nature of the Part into which it is deposited, various Effects are produced.

The Blood, Serum and Bile, if they are join'd with a predominant Acid. Alcali or muriatic Salt, Oil or Earth produces Diseases, that are agreeable to such as demonstrably arise from these things.

The Serum of the Blood, Bile and Urine, generate from their own matter, Stones that are compounded or made up of a volatile Spirit, Salt, Oil and an Earth from them, united together after a certain manner.

But these by extending in Substance, Weight and Motion, compress the neighbouring or adjacent Parts, and also the Vessels embracing the Stones in their Motion, by the Pressure of their Substance against hard, sharp or rough Bodies, they are broke in pieces and destroy'd; hence the Passage of the Humours is intercepted, Pain is created, Instammations, Ulcers, Gangreens, Callosities and the like Evils, which depend thereon.

The Eggs of Infects that are received or taken into the Body with the Air, Meat or Drink, being mix'd with the Intestinal Pituite or Mucus and with the Faces, lodging in the Cavities, by Warmth and

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Rest and Heat, at last Worms are produced, some of which are round or stat or such as are call'd Ascarides, and sometimes these are swallow'd down with the common Aliment, from whence growing by degrees, they become familiar and inherent in the Body.

But those by sucking moving about, vellicating and corroding the Guts and consuming the Chyle, irritate the Nerves, wound the Solids, and procure Nauseas, Horrors, Cardialgia's, Vomitings, Faintings, Leanness, a canine or voracious Appetite, Swelling of the Belly, &c. especially Wind and sudden Tu-

mors.

An external or internal Force of the moving Bodies, hurts or injures the simple Parts of the Body in every Action call'd mechanical, as hath been observ'd; neither can it be imputed to Heat, Cold, Moisture or Dryness, the Chymical Princi-

ples, acrid, alcali or acid.

The Matter or Body of the Disease subsisting in a grieved Part, being suddenly collected is call'd Fluxion, but slowly gathering together is a Collection; according to the Cause, it owns the Sluggishness of the solid Part not overcoming or expelling that which it began to form, or the Derivation of the present matter erring in the Part, which is now posses'd or inclos'd.

This Derivation, Fluxion, or Attraction call'd by the Antients, is made with Motion, Heat and Pain; and hence Diseases arise which are call'd with

Matter.

Poisons, the Plague, contagious things howsoever received, hurt the Solids and Fluids, or both together, so that the Course or Circuit of the vital Humours is stopt; they always indeed act by a mechanical Power, but oftentimes scarce to be understood or sufficiently explain'd, except by the Principles of the Chymists. It is easy to conceive how they hurt

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hurt the solid Parts by resolving them too much, relaxing, constringing and obstructing; but they deprave the Fluids by inspissating or thickning them too much, and rendring them acrid; hence both together are broken by this united Labour; and therefore they are chiefly swifter in the Nerves, Lungs and Blood; from whence these Diseases thus generated, were call'd by the Antients, Diseases of the Decay or Loss of the whole Substance.

And there are certain particular Causes of particular Diseases, which give rise to an ill Conformation of Parts, as the Imagination of the Mother, an imprudent Action of the Midwise, or Negligence of the Nurse or Keeper; for by this means the tender Body of the Insant, being squeez'd, handled, bound or swaddled, is so deform'd, that afterwards it is

hardly to be remedied.

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So likewise there are evident Causes of the Cavity, being vitiated in the ill Disposition of the Parts, whether internal or external; but the Origin of a Diaresis is from Extension, Acrimony, or external force.

A strong Compression, a forcible Separation, the Relaxation or Dissolution of the Ligaments, or binding Membranes, produce Laxations, Contorsions, Hermia's or Ruptures, and a descent or falling down of the Parts.

Cuts, Pricks, Wounds, Burns, Bruises, Contusions, Corrosions, &c. are particular or special Causes of the Solution of unity.

ΣΥΜΠΙΩΜΑΤΟΛΟΓΙ'Α ΠΑΘΟΛΟΓΙ'ΑΣ Symptomatological Pathology.

Hat Preternatural Thing which from the Difease, as a Cause is made so in the sick Body, that

that it can be distinguish'd from the Disease it self, and from the proximate Cause of it is call'd σύμπθωμα, the Symptom of the Disease, but if from the same Reason, it flows from the Cause of the Disease, it is call'd the Symptom of the Cause, but where it is produced from another prior Symptom, as its Cause, it is call'd σύμπθωμα συμπθώματ , but that which may be over and above added to the Disease, from a different Origin from the former, is rather call'd ἐπηθύμμα ἐπηθούμβου, συμβεβηκὸς.

The first Class of these is dispos'd according to the Series, or Order of Actions decay'd, lessen'd, destroy'd, increas'd and depray'd; from whence occurs an Explanation of the Symptoms of the Appetite upon Meat and Drink. Therefore Iurogestia, is a decay'd Appetite, arogestia, the same lost or destroy'd; impuria, an Abhorrence or loathing of Victuals; séries, revédus, Increase of Hunger or a canine Appetite, xiara, maranía, call'd Pica, a depray'd longing Appetite or Desire to such Things as can-

The Causes of these Symptoms are frequently sound to be in a sluggish viscid Flegm, where the Bile is wanting, there is a Suppression of the saline matter, and a Relaxation or Paralysis upon the Fibres: So likewise they proceed from the Putresaction of the Sordes, a watry Disposition of the Blood, Fatness, Idleness, an Acid, Saline, bilious Acrimony, Worms in the Stomach or Guts, the too great Strength of the Fibres, continued Motion, a sharp Humour predominating, an Alteration or Change of the Blood's Circulation, depray'd Imagination, especially in breeding Women.

An unsatiable Desire of Drink and too great Thirst, us'd to arise from excessive dryness, from the Thickness of the sluid Humors, from too much Heat, from a Muriatic, Armoniac, Alcaline, AroPoifo Ma

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matick Sharpness, or biting Quality, or lastly from Poisons.

Manducation or Chewing is injured from the vice or defect of the Mouth, Tongue, Teeth, Jaws, Saliva or Spittle and Muscles, which may be occasion'd by Wounds, an Inflamation, Palfy, Spasm or Con-

traction and Dryness.

Swallowing is hurt likewise from an Impediment of the Mouth, Tongue, Palate, Glands of the Ton-fillæ, the Uvula, Larynx, Pharynx, Gullet and upper Orifice of the Stomach, and this happens by Wounds, Inflamation, Pain, Spasms, Palsy, Dryness, a xor Soofwiar, or a Laxation of the Parts of the Larynx or the Vertebræ of the Neck, and the Want of Mucus.

The first Species of the Action of the Stomach being hurt, are and first, succeived, succeived, seasoure tha, suapposed, when the Contents of the Victuals are not digested either in the Stomach, or else too slowly and with difficulty, or they are chang'd from good Chyle into a contrary putrid Humor: The Causes are the same almost as the avogessa; but principally the Deficiency and Unactiveness of the Saliva of the Mouth and Stomach, the languid Organs of Inspiration; the Sordes Worms and Flux of putrid Humours; but a quick Digestion the rest being good is seldom a Difease or the Cause of one.

But the Faults of Expulsion from the Stomach are reckon'd to be Hicups, Nauseating, Vaniting, Choler, Ructations; the first of which is as may be seen a Convulsion of the Oesophagus or Gullet, drawing up the Ventricle and the Diaphragm; while the Diaphragm is likewise suddenly push'd down again; the Cause whereof is found to be a sudden swallowing of too much at once; abundance of eating or drinking, Acrimony contain'd in the Stomach, an Inslamation of the Oesophagus, Ventricle and Septum Transversum,

versum, a Spasm, from too much Evacuation or an

Excess of vomiting and sharp Poisons.

Nausea, or Loathing and Vomiting, seem to be retrogade, spasmodick Motions of the Muscular Fibres of the Gullet, Stomach and Guts; likewise strong Convulsions of the Abdominal Muscles and the Septum transversum, which moving slower, provoke a Loathing, but more violently vomiting. But these are made from too great Plenty or the Acrimony of the Aliment, from Poisons, Wounds of the Brain, Contusions, Compressions, Instamations; from an Instantation of the Diaphragm, Stomach, Intestines, Spleen, Liver, Kidneys, Pancreas, Mesentery; from an Irritation of the Gullet, from a disturb'd Motion of the Spirits, by musical Agitations or in a Coach Ship, &c. from an Idea of something, whereby they are provok'd to loathing and vomiting.

But the Expulsion of Choler violently moved upwards and downwards, from the Stomach and Guts, is a Convulsion creating a Vomit, and so likewise a strong Spasm of the Intestines downwards, great devouring of Summer Fruits, and hot Weather in the

Month of August.

Belching is an Explosion of the elastick matter, by a convulsive Contraction of the Fibres of the Oesophagus, the Stomach, the Intestines compressed, and afterwards from a Resolution they are set at Liberty again; but this proceeds from Crudity, Corruption, Sharpness, Summer Fruits, Must, sermenting Liquors, Poisons, Spasmodick Diseases, and all kinds of Acrimony.

But a violated Expulsion of the Stomach and Guts is also to be met with in reserveix or Lientery, which is a sudden Expulsion of the Aliment by Siege or Stool, which being received into the Stomach, had not yet had time to be changed and turned into Nourishment; the Cause of which is the Sluggishness or Unactivity of the Humours, as in the errogesta and

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and Intestines; while at the same time Respiration

is pretty strong.

If the Chyle be cast out together with the Faces by stool, it is call'd a Caliack Affection; where the Stomach and Humours seem to concur, as sufficiently powerful for a constituting Cause, while the Intestines are too lax, or the Mouths of the lacteal Vessels from some Cause or other are obstructed.

A Diarrhea is a frequent and plentiful casting out of liquid Excrements by stool; whether arising from Meat or Drink, or any other Humours contain'd in the Guts; the Cause whereof is either some acrid matter that irritates the Intestines, expressing or squeezing out the Humours from the Hepatick, Pancreatick, Mesenterick or Intestinal Vessel, while the Mouths of the Mesenterick and Lacteal Ducts are shut, or else it is a great Laxness of the Intestinal Fibres; and lastly, an Impediment or Hindrance to the other Excretions.

A Dysentery is a Diarrhea with remarkable Pain, the matter of which is the same with that of the Diarrhea, but more sharp and acrid, abounding besides with Bile, Serum, Blood, Intestinal Mucus, Pus, Sanies, Fibres, Caruncles and Membranes; from whence it hath the same Cause but more violent, which frequently from the Acrimony of the Humours occasions an Instamation, Ulcer or Gangrene of the Intestines or other Parts.

What we call the Iliack Passion, is a violent Rejection or casting up of whatever is taken by the Mouth, whether as Meat and Drink, or under the Denomination of Medicine, together with a Discharge of Chyle, Bile, the Serum of the Stomach, Pancreas and Intestines, Melancholy Bile, Mucus, Pus, the Faces of the Guts, &c. The proximate Cause of which Symptom always appears to be the inverted Motion of the Fibres of the Intestines, Stomach and Oesopha-

Oesophagus, happening together with some other Cause that may provoke to vomit, but the remote Cause is an Inflamation, Apostems, Scirrus, Cancer, hard Exces, Stone Hernia, Convulsion and Twisting of the Guts; from these Effects the Retention of the harder Faces is understood in its Origin, Cause and Nature.

But if the Generation and Excretion of the Bile into the Intestines, be interrupted or disturbed, these Symptoms first arise, yellow Jaundice, a Bilious Cachexy, Stone and Gravel in the Liver, Obstructions, white, hard and dry Excrements by Stool, the Mixture of what is eat and drank is impeded; there is a Tympany and a Dropsy, for its Cause it frequently owns the Instanation, Dryness and Obstruction of the Liver, or of the Humours contained therein, and the Abdominal Viscera, and the Inspissation or thickning of the Fluids thereof.

But if the Lympha, of the Pancreas, Liver and Intestines, be injur'd in the making or Motion thereof, such like Symptoms arise as we mention in the Diar-

rbea, because their Causes are alike.

The change of the Blood in the Heart, is according to the Modus, the Reception, Slowness or Expulsion thereof; which if too great, as to Motion, produces continued, burning, strong Fevers; but being much slower, and the Expulsion still more languid, then follows a weakness or decay of strength, polypous Concretions, cold, Leucophlegmatic Dropsies, and several other Diseases proceeding from hence.

A violated Action of the Lungs, as well that which serves for Respiration, as that for Transmission of Blood, consists first, in the Increase or Decrease of its Efficacy on the Blood; from the first seems to arise Indesois provision and inflammatory Affection, from the latter auatomosins. an Impediment of Sanguistication, and that of Nutrition; from whence arises a namesla, argoria, phois, that is a Cachery, Atrophy

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and Phthisick, with infinite other Mischiess; but the Cause of that injured Action is every Vice or Fault of those Multiplicity of Organs, which serve for

Respiration.

The Symptoms of the Secretion of Urine being interrupted are chiefly these, first, ixeela Ischuria, to wit, a total Retension of the Urine that is not at all excreted, the first Causes of which are a Plethora, an Instanation of the Reins, Ureters, Bladder, Neck of the Bladder and Urethra, a Spasm and Pressure of the same Parts; as also an Obstruction from a Stone

Pus, Gravel, Caruncle, Apostem and Tumour.

The Second, is Susseia a Dysury, or too great an Excretion of Urine with Trouble, Struggling and Pain, a Species wheteof is call'd sexyseia or the Strangury, where the Urine is emitted drop by drop, with a Sense of Heat; the Cause of either Evilbeing manifold, to wit first, from the Acrimony of new fermenting Malt Drink, Wine or the Faces or Sedement of either, Acid, Salt, Alcaline, Oleous, Aromatick or Bilious Humours; the Excoriation of the Parts of the Bladder or Urethra from Inflamation, or some Ulcer, from the grinding of a sharp or rough Stone, the taking of Cantharides, &c. a Stone or Tumour six'd in the Neck of the Bladder, or the Urethra.

Thirdly, Incontinence of Urine, which happens when that flows of its own accord, without the confent of the Will, or the affiftance either of that or Respiration: It proceeds chiefly from a Resolution of the Parts consumed by Separation, or from a Gangrene putrefying the Fibres of the Sphinster of the Bladder.

Lastly, the Fourth is ALEBITHE a Diabetes. with a frequent and plentiful passing through of chylous or milky Urine: The Cause whereof is supposed to be too great a Relaxation of the Fibres in the urinary Arteries concurring together with the Humours

very much diluted, both which proceed from watry Blood.

But an injur'd vital Action regards chiefly for its Symptoms, the Pulse of the Heart, the Exercise of Respiration, or both together; so that therefore first of all, the Palpitation of the Heart is reckon'd, that which is call'd a violent Contraction thereof, together with a great Resistance of Blood puls'd from the Heart, the Cause of it is oftentimes an inordinate and violent Impetus, of the vital Spirits on the sides of the Heart, as in the greatest Passions of the Mind, sudden Fear, Hysterick Affections, a sudden and violent Motion, precipitate waking; sometimes it is an Irritation of the Fibres of the Heart, made from a certain acrid Stimulum, as in the Cachochymia, the Inflamation of the Heart and Pericardium, or from these Disaffections, Stone, Worms, Hair, an Aneurism; thence from thickned or congealed Blood, a Polypus, at length from cartilaginous or bony Arteries, or from these obstructed at their Extremities.

2ly, The intermitting Pulse of the Arteries happens, either from the ill Disposition of the Liquid of the Cerebellum unequally flowing into the Heart, or from the Fault of the Vessels transmitting the Blood and Humours; or else lastly, from the vitiated Humour which flows thro' the Vessels; from whence the Cause of this Mischief is various, as Convulsion, Polypus, Cachochymia, an Arterial, Pulmonick or Cardiack Inflamation, a Deficiency of Blood, the Arteries being bony, cartilaginous, subject to Aneurism, or stopt with a Stone, or else the Heart having an ill Conformation from a different Cause.

A frequent Pulse always arises from a quick Syftolick Contraction of the Heart; but this is from a more frequent Influx of the Spirits of the Cerebellum, and a more difficult Progress of the Liquor expell'd;

whereby they become acrid and obstructed.

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The Diminution or lessening of the Pulse, which is reduced to a λειποθυμία, or a finking of the Spirits, where they are so weak that they are scarce able to support the Body; a remoduzia is a Defection of the Animal Spirits, when they fail fo, as to deny the Affistance of the Natural Heat; the συγκοπή is where the Heart fo deficient, that Heat, Motion and Sense are almost lost, and is attended with cold Sweats; ασφυξία is a Privation or Want of Pulse, fince no Artery appears to move, and where all is lost as to Sense, and they look like the Image of Death: The various Causes of these Symptoms, consist in the various degrees of them; as first, horrid Ideas of a Thing, Sorrow, Affections of the Mind, Spasms, especially in fuch as fuffer a great Loss of Blood, as in Child-bearing, Abortion, &c.

An interrupted Respiration or difficulty of breathing, reckons its sirst Symptoms to be first, an arrola a total Deprivation of Breath, or where it intirely ceases, and places its first Cause in the Lipothimia, or sinking of the Spirits, also it hath regard to a vitiated Air, poisonous Vapours, caustick, acid and austere Bodies: A Palsy or Spasm of the Organs of Respiration, destroys altogether the Function or Use of these

Parts.

2ly, A Dumroia or Dyspnaa, in which Respiration is made with Trouble, Pain, and Labour, this is of the same Nature with the former but lighter, whereby it renders the Conformation of the Breast worse than the rest.

zly, An Adua or Asthma, which is a frequent, troublesome Wheasing Kind of Breathing; often proceeding from an obstinate Dyspnoeae, but chiefly as it appears from a spasmodick Constriction of the Muscular Fibres in the Lungs.

or difficulty of breathing, with the Neck erect, and the Breast at Liberty, proceeding from the same

Cause with the others, but acting and receding

by various Infults or Attacks.

sly, A suffocating Catarrh, which seems as if it would kill instantly, and is call'd antologor a strangling, this hath the same Origin as the rest, but is more frequent or common; for from the instand matter, there is a sudden Distillation salls, upon the Jaws and Lungs; this is often observed to proceed from the greatest disorder of the Nerves, and a large Po-

lypus of the Heart thrust into the Lungs.

But all these Symptoms, appear to be produced from some remarkable Causes, by examining of dead Bodies; as first, the Repletion of the Thorax by extravasated Lympha, Pus and Blood; likewise the Instanation of the Larynx, Aspera Arteria, Bronchia, Lungs, Pleura, Mediastinum, Diaphragm, and Muscles of the Breast serving for Respiration, as those of the Abdomen; and so from the different matter of a Polypus, Flegm, Chalk, Gravel, Stones and Pus; together with a Tumour about the Larynx, and in the Lungs, whether instammatory or separated, a Scirrhus and Cancer; and at last an Adhesion of the Lungs to the Pleura.

The numerous Symptoms attending the Diseases of Sight or the Eye, are taken from the Enquiry into their Causes, according to the Diversity of Situation; for first, the coercing or binding Parts affect the Eye by pressing the Bulb thereof, Protrusion, Extrusion, Corrosion, by instam'd Tumours, Apostems, Scirrbus's, Cancers Exostoses, a Caries of the Bones, forming the Orbit of the Eye: From whence the Figure thereof, the Humours, Circulation, Sight, Axis, and Collection of the Rays, are depray'd and

loose their proper Office.

From hence also, the Eye-lids being inflam'd, separated, inflated, conglutinated and concreted, wonderfully disturb the Sight, from several different

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Causes, but chiefly and most frequently by the ill Habit or Disposition of the sebacious or sewet Glands.

So likewise from too great Plenty of Tears, that are sharp and thick, arising drop by drop at the Edges of the Eye-lids, whence they distill from the Eyes upon the Cheeks; these troublesome Fluids disturb the Sight, cause inflammatory Consumptions of the Part, Dimness of Sight, and what we call Fiftulæ Lachrymales. Those Things happen by reaion of too great a Laxness of the Lachrymal Gland, or from the Acrimony and too much Motion of the lachrymal Substance, and perhaps from the ill Configuration of the Palpebral Tarlus, or from a various Disposition of the little Mouths of the Eye-lids, that absorb the Tears, and of the Pipes that convey them into a lachrymal Bag; therefore howfoever they recede from their Natural State, the Channel of the Noie, or the Membrane that invests the Nostrils within, whereby they hinder their Passage out by this Canal into the Cavities of the Nostrils, they err, and are in an evil Disposition.

Hence the Vision is deprav'd, impeded or lost, by darkning, or obscuring and thickning the Tunica Cornea & adnata, whence comes an Oedema Phlystena, Instammation, a Nail, Pearl, Cicatrix, white Speck or Cartilage; all which may happen from various

and different Causes.

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When the aqueous Humour is wanting, there is a flagging of the Eye and the Cornea becomes wrinkled; if it abounds or exceeds, there is a protuberant or elephantine Eye, if it flagnates, by not being recruited, but putrefying, the whole Fabrick of the Eye finks, if it takes a Colour or thickens, whether into the Nature of Mucus or Pituita; hence arises Suffusions and Cataracts, these are for the most Part betwixt the inward Membranes of the Uvea and the smooth Chrystalline; and the Cause is chiefly an Instamma-

Inflammation, Cachochymia, or too imprudent Appli-

cation of coagulating Things.

If the Uvea is inflam'd, there arises a very painful Opthalmia, most pernicious to the Sight; if it is separated, the Quickness and Sight is lost; if it be immoveable and contracted, there arises an inceresconda, which makes that they can only see at full day, and happens where the Cataract is less, thinner at the Edges, and thicker in the middle; but if motionless, and yet very open or broad, then there is a runlanamía or an Owl-light Sight.

It is certain, that the Opace Chrystalline Lens being inflam'd, separated, hydropick, decay'd and consumed, produces a Glaucoma, a Cataract, dull Sight, and a clowdy Blindness call'd augnomia, or a heavy obtuse Sight; but if the same is injur'd, in its Figure, Substance, Thickness, or Thinness, it will create many, various, and those often wonderful ill Acci-

dents to the Sight.

Nay the too spherical Figure of the prominent Bulb, and also the Smallness of the Pupilla, and many other Conditions hitherto less clearly beheld in the length of the Eye, may produce in the Lens it self and its Situation a uvunia, or short Sightedness; as on the contrary in a flatter Eye, from the various Disposition of the Lens and its Situation, may arise a nge-

oBuonia or a distant Sight.

The Membranes of the Retina, by means of their many different Vessels, can produce great variety of Accidents, as Dropsy, Oedema, Phlystena, Instammation and Compression; and so of the optick Nerve, and the Membranes that inclose: Then a Tumour, Steatoma, Abscess, Hydatides, Stones, Instammations, Corruptions and Obstructions may so happen to the Brain, that a free Communication is stopt betwixt the optick Nerve, and its Origin in the medullary Part of the Cerebrum, or esse is intirely destroy'd; all these by different ways strike the Organ with an Imagina-

Imagination of Flakes and Motes dancing before the Eyes; this is call'd analows a Dimness of Sight and a Gutta Serena.

A Pally or Spasm of the Muscles that move the Eye, the Distractions or various Contorsions arising from the Bones of the Orbit ill dispos'd, as also Wounds, Ulcers, Inflammations and Compressions, may produce the pivorslian, or squinting Eye, and such

like firange Disaffections.

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At last, the Tunica Choroides of Ruysch, and the Uvea abounding with Blood Vessels, are very lyable to Inslammations and Separations, so that they easily produce an worder or Suffusion; and from the various Diseases of the different Parts in the Eye, frequently occasion Consusion of Sight, Dimness, and at length Blindness.

The first Symptoms that are reckon'd in the Diseases of the Ear, are an Increase or Decrease, a taking

away or a deprav'd Hearing.

In the acutest Diseases of the Brain, Nerves, and Membranes, it appears in these, as if too tense, or too much stretch'd, that there frequently arises almost an intollerable of unxola, Acuteness or Quickness of hearing, affecting the Brain strongly with the smallest Sound, and exciting, sometimes convulsive Motions.

That is call'd, Bagunnsia or a thick, dull bearing, when the Perception of the Sound is less than the Size, that is requir'd in Health; but it arises from very many and those various Causes, commodiously situated according to the various Places affected; for the external Parts of the Ear may be too plane or slat or taken away; the Meatus Auditorius too strait or narrow, obstructed with some Tumour, with Insects, Pus, Sordes or concreted Wax: The Membrane of the Tympanum may be wounded, relaxed, callous'd, or cover'd with a sungous, spungy, thick Crust; the internal Concha may be fill'd with Ichor, Pus, or

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Flegm, with Tumours of the Membrane invefling that on every side; Eustachius Canal may be stopt or obstructed from the falling in of Dust or the like, after the breaking the Membrane of the Tympanum, the Officula loos'd or broke off from its Connexion, and carry'd thro' the Meatus, or from the Separation of the little Membrane, as it often happens after cruel inflammatory Pains of the internal Ear, or when the Officula is wanting by reason of an ill Conformation of the Part: So likewise Dryness Relaxation, Thickness, an Inundation or overflowing of Moisture, too great Tension, Corruption or Induration of the little round Membrane of the Fenestra and Ovalis, the Vestibulum, Labyrinth, Coeblea and Meatus of the Os petrosum, the various Vices, Inflammations, Obstructions, Palsies, and those which may derive themselves from thence as from their Causes, and also the contrary of them from the Structure of the hearing; laftly, from every Impediment whereby the fost Auditory Nerve may be stopt or hindred in the middle way, from its Entrance into the Os Petrofum, even to the Medulla oblongata, or hence, even to the Origin in the Medulla of the Brain, as Inflammations, Tumours, Exoftoses, a wounded Function of the Cerebrum, and many Diseases besides, from whence we may find the difficult Reason for the Cure of them.

Likewise from the Vice of the external Ear, chiefly the humid, and cloudy, or that of the internal, not having free Passage in or out, there happens a depraved Hearing; first of all, these little Arteries are damag'd, which supply the small Membranes that are dispers'd every where, in the whole Organ of Hearing, from whence is easily understood the Reason of the tinckling, humming, murmuring, still Noise in the Ear.

If at length all these Vices continue to increase, then arises a research, or perfect Deafness; from whence proceeds

proceeds the Ignorance or Forgetfulness of speaking; the Cause whereof is often a Concretion of Eustachius's Tube, and frequently in the Venereal Disease from the ulcer'd, rotten hollow Jaws, from thence by Reason of the Crudity of their Lips, united with the Concretes.

Smelling is also lessen'd or quite lost,; first, from the Defect or Solidity of the four Spungy Officula or little Bones, and the smallest caverns or hollows in the Os frontis, the upper Maxilla, and the Os Cuneiforme; 2ly, From the Dryness, Moisture, Inflamma-Separation or Gangrene of the olfactory aly, From the compress'd olfactory Membrane. Nerves by certain Tumours created here with Exostoses and Polypus's. 4ly, From Vices in the Brain to the Origin of those Nerves, as hath been said before in the other Senses, it is also deprav'd from a stench of some matter, resting upon these cavernous Places, and continually exhaling.

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The Taste is likewise diminish'd, taken away or deprav'd: The first Two of these will happen, if the tasting Papillæ of the Tongue be cover'd with a Cruft, Foulness, Slime, Thrush, Pustules, Warts, Inflamation and Dryness, or an accidental Wounding of the Nerves, of the fifth Pair: But this Sense is deprav'd from the Vice of the predominant Humour, first, that often sticks in the Saliva pour'd into the Mouth, which erring in Taste, produces here many Effects of a bilious, alcaline, acid, faline, æruginous, oily, saccharine, or cadaverous Nature.

The Sense of Feeling us'd to be injur'd, first, by a Stupor or Numbness that was scarce perceivable, or at least blunt or obtuse, as it were by a Medium interposing; which happens from too great a coldness of the extream Organ, or from a Defect of the Nerve or Brain, as by an Interpolition of some matter, unapt or improper to that Sense; from thence in too acute a Sensibility, or perhaps from too much stretching and

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and Softness of the Nerve together, likewise from a lost Faculty of touching from any Cause, whereby the Nerves, Brain, or both, are render'd unapt. for performing their Duty, as may be seen in the

Apoplexy and Pally.

Waking or Watchfulness rises sirst, from too great a Determination of the Nervous Fluid, to the Organs of Sense: 2ly, From too sudden or violent a Motion thereof towards the Brain, the Inserior Parts being obstructed by Cold, or any other Cause, as in hypochondriack, melancholy, mad Persons, who are cold in the lower Parts. 3ly, From some Irritation wheresoever seated, that vellicates the Organs of Sense, especially the Brain. 4ly, From too great Motion of the Fluids, where the Mestus's or Passages of the Brain are open. 5ly, From Diseases, in which these Things mention'd before, are predominant, as from Fevers, Frenses, Melancholy, Grief, Separations, and the like.

But too much Sleep may arise from any Cause, that stops the free Flux and Reslux of the Spirits, from the Medulla of the Brain, by the Nerves to the Organs of Sense, and of the Muscles subservient to the Will, and then again, from these to the Origin of these Nerves in the Medulla of the Brain: But this Cause is still manifold, yet easily referred to a Plethora, Obstruction, Essusion of Humours, the Compression or Squeezing of the Vessels, Instammation, Separation, Gangrene, Slothfulness, the Use of Opium, Narcoticks, Arematicks, Fermenting, spirituous Things, too much applyed to the Nose, hard Meals, Fat, and to great Quantities lodging long upon the Sto-

mach.

Κομα είγευπνοδες, Coma nocturnæ Vigiliæ is an unfurmountable Inclination to Sleep, with a perpetual
and terrible Twitching in Sleep, which derives it
felf from the like Causes as the former, but is attended with a great Stimulation of the Parts, frequently

quently proceeding from a violent Inflammation that happens to be join'd with it. Koua invades is a continued Sleeping, with as continued a Relapse into the same Condition upon Waking. Kde@, Carus is a profound Sleep with a sudden Loss of Sense and Motion, together with an acute Fever and a Difficulty to be wak'd, this is but a flighter kind of Andaey G., Lethargus or Lethargy, is a deep. quiet, forgetful Sleepiness, proceeding from a slow. cold Cause, in many things much like the rest, and frequently arising from the meeting together of several such like Causes. A rasagogg differs scarce at

all, or very little from the former.

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Avaidnoia, a Faculty of perceiving the Actions of sensible Objects in the Organs of the external Senses taken away, of which there are different degrees. Stupidity, Dulness, Confusion; the Memory more or less taken away or confus'd; an imperfect Faculty of Judging, loft or confus'd; an imperfect Faculty of Reasoning, lost or disturb'd; Delirium, Folly, Madness, a depraved Imagination, and all Diseases may be refer'd hither, that depend on many and various Causes, yet so that they may be properly derived from these, Age, Affections of the Mind. the Rigidity, Laxity, Concretion or Deletion of the Solids: The Thickness, Acrimony, Thinness and Unactivity of the Fluids, may be discover'd as the Principle amongst others.

Amonangia, the Apoplexy is a sudden and intire Loss of the Senses, external and internal, and also of all voluntary Motion, yet with some continuation of Breathing and a Pulse; its Cause is seated in the Brain, which hinders or stops the Flux of the Spirits, from the Origine of the Medulla of the Brain thro' the Nerves thereof; this is many ways, and may be fitly enough refer'd to all those which compress the Brain, outwardly or inwardly, being reducible to Five Classes. First, Fractures, Impressions, Exoftoses, Tumors,

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Tumors, Compressions of the Cranium, first of all, in Youth and Infancy, when it is yet foft and tender. 2ly, The Humours of Blood, Serum, Pus, Flegm, Sanies, either flagnating or pour'd out into those Places, where they may be compress'd, or corrode the Brain and its Membranes; as betwixt the Skull and the Meninges, betwixt these and the Brain, in the Ventricles thereof, to the Medulla oblongata and Medulla spinalis. 3ly, Inflammatory, aqueous, serous, purulent, mucous, scirrhous, stony Tumors, in the fame places, and subject to the same effect of Compression. 4ly, Impediments from a Flux of Blood running to the Brain, especially from a Fault of the Veffels being wounded, compress'd or obstructed from a Polypus. 5ly, The like Impediments rifing in the little Veins, Sinus's and larger Ducts, in which the fanguineous Humour returns from the Brain; but these Impediments how great soever, proceed from the Compression of the Veins,

nachwors, a Palsy renders the flaccid Muscles motionless, the Cause whereof is a Stoppage of the Influx of the Spirits into the Texture of the Muscles, or of the Arterial Blood into its Vessels; this happens from a Fault in the Brain, Nerves, the Muscle

it self, or its Arteries.

Παρσπληγία, is a Loss of Motion of all the Muscles under the Head, which have their Nerves from the Cerebrum and Cerebellum, issuing from under the Cranium; the Cause therefore chiefly lodges in the Fourth Ventricle of the Brain, or at the Beginnings of the spinal Marrow.

Humanyia, Hemiplegia is the same Disease, but only that it seizes one side of the Body; hence the Cause is the same, but it derives it self only from one side of the Brain, or the Medulla spinalis.

riaejauois, or the Pally of a particular Part is clearly known; and therefore we understand, why in the Apoplexy there is likewise a Paraplegia, or at least

least a strong Hemiplegia? also why upon the removing of the Apoplexy, neither of these succeed, or if

they do, they last not long.

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ETILATER, the Epilepsis or Falling Sickness, is a sudden and intire Deprivation or Loss of the Senses external and internal, and also of voluntary Motion, together with reciprocal and violent Convulsions, and a Return from them; from whence here seems to concur a double, and as it were opposite or contrary Cause, partly Apoplestick, and partly Comatous, acting by turns, but neither so strong, nor continuing so long a time.

king as if the Objects turn'd round, and a Trembling of the Limbs, proceeding from an Apople-

ctick Cause, but not so severe.

violent Contraction of the Muscle, with the attracted Part also hanging to the Muscle: The Cause arises from a strong and continued Instux of the nervous Fluid into the Muscle, of which there are infinite Causes in the Blood, Arteries, Meninges, Brain, Nerves, Muscles and Cranium.

Tétare, or Rigor, is an involuntary, violent Convulsion, being disagreeable to the bending and extending Part of the proper Muscles, which is either universal of them all together, or singular of one

certain particular Limb or Member.

Eunes Sorot O, is a Spalm of the Muscles, bending

forward the Head, Neck, Breast and Loins.

Dalbitor , is a Spalm of the Muscles bending backwards, the Head, Neck and Back; and it appears easy to prove, that the Cause of the latter is one and the same as that of the Spasm, but more universal, and almost always subtil, sharp and poisonous.

Hence 'tis plainly evident, why a Vertigo and Convulsion, first of all being universal, the Falling-fickness,

fickness, if great and obstinate, and from an internal Cause, almost always terminate at last in the Apoplexy.

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A vitiated Quality of the Body, is call'd that which hurts or annoys the Disposition, that extends it self to, or mixes with the Senses; but this is chiefly to be consider'd as to Colour and Smell.

The Colour of the Skin, the Cuticle, the Tunica adnata of the Eye, the Cornea, Lips, Mouth, Tongue, Jaws and Caruncles of the Eye being pale, yellow, green, livid, red or black depends on the like Bodies, shining thro' the pellucid Vessels, and as they are mutually received in a various Series or Order, and also claim different Causes, as appears in the Phlogosis, or particular, Inslammation, Gangrene and Sphacelus.

The pale, red, yellow, black or brown Colour of the Bones, appears from a Contusion, Inslammation, Abscesses, a morbid Medulla, the taking away of the Periosteum, a Caries and Spina ventosa.

But a Smell or Stench arises from stagnating, corrupted or venemous Humours, and that from every Cause which attenuates the Oils and Salts too much, and renders them too volatile, as Famine, Hear, too great Motion or Acrimony of what is eat and drank.

ZHMEIΩTIKH Z. The Semeiotical Part of Physick, being first General.

Since a Disease is an Effect depending on its Cause, it is a particular Ens or Being distinct from all others, and therefore ought to be accurately understood in its own proper and singular Nature, that

that it may be cured; which will appear to be as necessary in *Health*, and the various State and Condition thereof.

But the present Nature of Health, or its Desect, a Disease, rarely appears in the Senses by it self, neisis it so conspicuous by it self, where being present in the Body, they may be known; but the reason

of both frequently lies hid.

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But from the Presence of either, there are certain Effects depending, on the Exercise or Performance of the salubrious Functions, or on the Impediment of them: These are indeed distinct from those Causes, but yet so depend upon them, that they manifest their Nature or Disposition, and since they are observable by the Eye of the Senses, they may afford great Light to these Enquiries.

But besides the Knowledge of the applying Cause observ'd in any Part of the Body, which in Physiology sirst teaches the known Nature of the Effect which follows from thence, whether that be salutary or pernicious or suture; neither is it of great moment, whether this Cause be external, internal, natural, accidental, salutiferous, morbid or mortal.

These related Effects surthermore, and the said Causes for simuch as they are taken to be Sensibles, or how nearly deducted from thence, are call'd particula, Phanomena, or Appearances; but these us'd to be call'd Signs, when from the Observation of them in Sense, by the Law of right Reason is demonstrated the Presence, Nature, Condition and Event, as well of Health, as of a Disease and Death.

Those things are called Siayvasina or Sunalina, when they declare or pronounce the present State and Condition, of the living Body, healthful, sick or dying; but if they pronounce what shall happen hereaster, then they are call'd mergrusina, or Prognosticks; but where they proceed, and at last come within

254 The Semeiotical Part of Physick, &c.

within the compass of our Knowledge, they are

term'd by Physicians avaunsina.

But in Diseases that declare, the Sign which is proper to the Disease and inseparable from it, as arising from the Nature thereof, that is call'd made-

yroundy, or the Pathonomick Sign.

Hence the Knowledge thereof is so highly necessary and useful, the often difficult in the Enquiry, yet it is always present in the Disease, as long as it keeps its natural Course, and is frequently manifest, when there is a Complication of several concurring Signs.

But those Signs which teach us the Alteration and various Conditions of a Disease, are call'd by the

Name of Employable or Symptoms.

The Efficacy of which is so powerful to the wellunderstanding and the Cure of Diseases, that there is scarce any other that brings such Advantage to the Practice of Physick, from whence also arise the

greatest Mischiefs in the Neglect of them.

But since all these are Essects produc'd from the Cause of a Disease in the Disease it self, and the Symptoms daily chang'd; therefore they observe in Diseases the present Condition of its Matter at some certain time, which first produced the Disease, or of that which was produced from the Disease; wherefore they may be assign'd to these three Classes, which are

First, Crudity and Digestion.

2ly, The Termination thereof in Health, a Difease or Death.

3ly, Secretion, Excretion and the digested matter, which are therefore call'd Decretoria vel redina, Decretory or Critical.

General Signs of the best State of Health.

Hele ought to be expected or required from the Actions of the Body, being exercised with Ease, Use, Pleasure and Constancy; The first Three of which Conditions may be found easy, but the Fourth more difficult; for the great Constancy is only known by those Signs, which indicate that there will be a future long Life in that Body; and hence also from the same reason they frequently pronounce a firm State of Health.

But all those Signs of long Life, are the Effects of the Disposition or Nature of the whole Machine, as to the Solids and Fluids, from whence in the first place the Durableness thereof depends as to the intire Compages or Structure; but this is the Reduction of the Aliment into the like nature with those things

that now make up the found Machine.

By the Assistance of a tedious Observation, these

Signs may be reduced to those Classes.

First, To Generation; a Conception from healthful, vigorous Parents, of full Age, rarely using Venery, but that with Heat, and in the Morning after found Sleep, and in Spring time, that being chiefly falubrious.

2ly, To Bearing in the Womb; the pregnant Mother being found, using her Body to laborious Exercise, having a quiet Mind, and only carrying one Fatus or Burthen in the Womb, that it may have Plenty of wholfome Food.

3ly, To the Birth, the Child being born after Nine complete Months from the first Conception, and especially coming into the World in December,

Fanuary or February.

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4ly, To the modus or manner of the Body's Growth, it being flow and proportionable in every part, still increasing in Substance and Strength together,

256 General Signs of the best State of Health.

gether, to the Twenty fifth Year of his Age and

upwards.

5ly, To the Habit or Shape of the Body; a broad, large Chest, the Abdomen tight and small, the Shoulders, Arms, Thighs and Legs strong, muscular and hairy; the Cranium large and capacious, especially the Occiput, the Skin hard, and the Body sleshy, but not fat.

6ly, To the Humors, a florid but thick Blood, which when extravasated, is sibrous and strong, and will soon congeal into a hard Substance, the rest of the Humours shou'd be plentiful and tough,

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moderately hot, less oily and soft.

7ly, To the Actions; a flow, large, full, easy, even Respiration, with the least apparent Alteration of the Pneumonick Organs; a flow, large, full, equal, strong, constant or steady Pulse of the Arteries, nor usually changeable from a small Cause, a flow Provocation to Stool, the Faces being of a good consistence with Inconvenience to the Body, little Urine but well digested, rare Sweats, sound Sleep that is refreshing, a greedy Appetite with easy Digestion, moderate Labour, a dull Genius and not too violent Motion of the Mind or Body, with a Constancy to accidental Changes.

But that the Fabrick of the Body may be fit to exercife its Actions easily, usefully and pleasantly, is to be discovered, first, From the very Tryal of the Senses. 2ly, If the Signs are present after the manner they have been explained. 3ly, If the solid Parts are found to be strong, tough and elastick, as to the Matter of which they are formed; if they are knit together after such a manner, in such a situation and proportion, that the proper, as well as common Motions of the Body may be expeditiously and easily performed, as well in the Solids as the Fluids. 4ly, If that be the Nature of the Humours, which produces intestine, circulatory, secretory

The Signs of a particular State of Health. 257 tory, nutritive and excretory Motions, without inequality, and without the Effects of this. And indeed the most evident Sign that teaches that this equality is there, is the Absence of Pulsations, Tumors, Pains, and Heat. 5ly, If that is the reason of the Union betwixt the Mind and Body, from whence proceed moderate not violent Passions. 6ly, If there is a rosy white Colour, or of a good liking black, the Heat be moderate, and a Lightness upon the Senses. 7ly, The great Strength of resisting all Causes of Diseases.

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But the greatest Power of overcoming the particular Cause of this or that Disease, whether poisonous or contagious, does not always denote the most perfect Health, but the contrary, as is clearly

evident in contagious and venemous Diseases.

The Signs of a particular State of Health.

THE best singular Condition of every Viscera is known by its Action being found ready, apt and regular in the performing its Essects; which since in Physiology they are so largely explain'd, they may easily be refer'd to that, with the justest Reason.

But Health is a Condition that lodges in the whole Texture of all the Body together, confifting of Solids and Fluids; therefore this is particular to every Man, and confequently is only fuch as it is from the Nature of every fingle Body; hence therefore the various Bodies which differ so much, as well in Solids as Fluids, yet may be singularly or distinctly healthful; from this the Antients call'd it is now fregola, an Idiosynerasy, of the Health of the Temperament or Constitution, which would be more difficult to determine to singular Heads; but yet the Division propos'd by the Antients, into a hot,

258 The Signs of a particular State of Health.

cold, moist, dry, bilious, sanguine, slegmatick, melancholy Temperament, hath its Use in Physick.

The Signs of a hot Constitution are describ'd to be yellow, gross Hair abounding throughout the whole Body in great Plenty; a reddish Colour of the Eyes in the white Part, very red in the lachrymal Caruncles, the Face, Lips and Mouth; the Body slender, agile, robust and hot; the Pulse large and quick, addicted to Passion, but of short continuance: In these the Vessels seem to be robust, the Viscera strong, the Humours very moveable and sibrous; in which moist, diluting and well temper'd things are serviceable, but if too hot and dry, very injurious to the Body.

The Signs of a cold Constitution are just the contrary; the Hair is thin, the Complexion pale, the Body gross, slow, weak, cold and easily subject to swell, the Pulse is less and heavy; in these the Humours are soft, wat'ry and pituitous, the Solids lax and slabby, corroborating warm things are use-

ful, but the cold and moist relax.

The dry Temperament hath a near relation to the hot, especially if attended with Leanness; the Vessels are here contracted, the Moissure is very little, and that almost acrid; therefore it is very ad-

vantagious to the dry Constitution.

A bilious Temperament is describ'd by Plenty of black curled Hair, Hardness and Leanness of the sleshy Parts, by a brown Complexion with large Veins, a great quick Pulse, Obstinacy and Anger; in these there appears to be a greater quantity of the Solids than the Fluids; the hot and dry Medicines are hurtful, but the moist and cooling prostable.

But a sanguine Constitution is distinguish'd by fine slaxen or light brown colour'd Hair, soft Flesh and abundance of it, large blew Veins, distended with Blood, a rosy Complexion, Anger and a Readiness diness to Action, Evacuatories and temperate things are serviceable to these, but heating stimulating

things injurious.

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Likewise the slegmatick is depicted with a greater Smoothness of the Skin, white thin Hair that grows but slowly, a white, tumid, soft, fat Body, narrow Veins that lie obscure; in these the Blood Vessels seem to be strait, but they are more extended in the cold Constitutions; hence moist and cold things are chiefly pernicious, but whatever heats, streng-

thens and dries is affifting.

Lastly, the Indications of a melancholy Temperament are Baldness, black Hair, great Leanness, much Dryness, the Complexion for the most part black, they are constant in their Inclinations, remember Injuries, and have great Penetration in Knowledge; wherefore in these the Vessels appear close, strong, the Humours are dense and tenacious, not easy to be divided or chang'd; hot, dry and acrid things are most hurtful to such, but they are reliev'd with all moissing, cooling, relaxing, emollient, gentle Dissolvents.

The Signs of Diseases.

HE Signs of a future Disease are known or discover'd first, from the unusual Change of certain Functions, especially if the Perspiration of Sanctorius be lessen'd from an unaccustom'd Weariness, and a sensible Weight or Heaviness in the Body. 2ly, From an accurate Knowledge of the Temperament in every Man, and also from the particular Structure of every Body. 3ly, From the Observation of Classes, in which are contain'd the Procatarctick Causes. 4ly, From the certain Knowledge of Epidemical Diseases reigning at any time.

The Signs of Diseases that are past, are learnt from their known Essects, that are lest behind after some Injury of any solid Part, or the consequences of the offending Humours, or after some Actions that are interrupted; for he that considers the Use of the Parts in Health, knows the Desects that remain, from whence he conceives the nature of the Disease.

The Signs of a Disease present, have regard to the Causes, Nature, Symptoms, State and Event

thereof.

The Signs indicating the nature of the Cause of a Disease, are discover'd, first, From the Observation of these things, which apply'd to the Body, constitute Diseases, or by Application make them, as we may see in the Aitiological Pathology. 2ly, From the Idiosyncrasy. 3ly, From the observ'd Nature of

A Disease of the solid Part is known, first, From the strength, quality and manner of Application, from the Duration of the Cause whether internal or external. 2ly, From the sensible Change of the Qualities, Situation and Connexion of the Place asserted. 3ly, From the wounded Functions. 4ly, From the Excretions produced from the Place asserted.

fected, directly or obliquely.

Wounds, Contusions, Corrosions, Burns, if apparent to the Senses, are known thereby. But the Condition and State of these is known, first, From Sight or looking upon them. 2ly, From the nature of the Part injured; and 2ly, From the Symptoms.

The Event of them is presaged; first, From the Necessity of the Function hurt, to Life or Health. 2ly, From the nature of the wounded Part. 3ly, From the very manner of the Wound. 4ly, From the Temperament or Constitution of the Patient.

Ulcers, Fistula's, Scirrbus, Cancers, Inflammations, Gangreens, being apparent to the Senses, easily shows

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that they are known by their Pathognomick Signs, which are contain'd in the very Definition of them. But the State of them is known, first, From Inspection, Taste and Smell. 2ly, From the nature of the Part injured. 3ly, From the Observation of the Symptoms.

But the Event is presag'd, first, From the nature of the Mischief. 2ly, From the nature of the Part, and its consequence upon Life or Health. 3ly, From the Vicinity of other known Parts. 4ly, From the difficulty of giving Relief. 5ly, From Constitution.

But these Evils lie within, hid from the Senses, they are yet to be discover'd, by enquiring into the Signs. First, From the nature of the Cause. 2ly, From some Function that is hurt or impeded. 3ly, From the Excretions. 4ly, From the Place affected, known by Anatomy, whether internal or external. 5ly, From the sensible quality of the Part that is affected.

The Place affected in Diseases, if external, hath most commonly Signs, that lie open to the external Senses, from whence it is easily detected; for there are many of these, as Wounds, Contusions, Inflammations, Oedema's, Ulcers, Gangrenes, Luxations, Distortions, Fractures, Caries, Atrophia's, Scirrbus, Cancers, &c. likewise a comparing of the Function injured with the Origine of that Instrument, whereby the Action is made whole, teaches us the Seat of the Disease.

An internal affected Place, appearing more difficultly from an internal Cause, is yet discoverable. First, From the known Nature of the Cause. 2ly, From the injured Function. 3ly, From the Nature of the Disease. 4ly, From the Excretions. 5ly, From the Symptoms being well known and compared with the Anatomical Knowledge of the Parts; for from these Five Fountains, internal Diseases are more particularly known, such as lurk or S 2 lie

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lie hid in the Brane, Nose, Face, Breast, Pleura, Mediastinum, Pericardium, Lungs, Heart, Diaphragm, Liver, Spleen, Stomach, Pancreas, Mesentery, Guts, Reins, Ureters, Bladder, Urethra, Womb and Parts of Generation.

The Signs of an acute Disease proceeding from the Humours, are taken, first, From the Celerity and Violence of the Increase of the Disease it self, 2ly, From the Vehemence of the Symptoms. 3ly, From the wounded Functions. 4ly, From the things excreted. 5ly, From an Epidemick Constitution. 6ly, From the Season of the Year. 7ly, From the Age, Sex, Life and Temperament of the Patient.

If all these Signs are strong, they pronounce great Danger, but if lighter, they promise some Good.

Again, the Signs of an Acute Disease in the Fluids, which define and presage the Condition, Danger, Duration and Event, are understood from the observ'd Effects depending on our vitiated, or deprav'd Humours.

The Signs of Acrimony in the Humours are, first Pain without any Signs of an increased Motion; and without any apparent Obstruction, as the eating or wasting of the Parts without any manifest Tumors.

The Signs of an alcaline Acrimony, are a stinking Cadaver, smelling in the whole or in part, the Sapor of Flesh, or putressed Urine eating away of Flesh of an ash, lead or black Colour, and that increasing swiftly by degrees, a lost Appetite abhoring all forts of Meat, the Faces thin, shining, cadaverous, brown or black, the Urine acrid, thick, brown and frothy, setid like that of Putresaction, and scarce letting sall any Sediment, little or no Sweat, or else like the Urine describ'd, the external Skin dry, and the inward Part of the Nostrils, Mouth,

nels

Mouth, Tongue, Jaws, the Blood thin, broken, florid and scarcely adhering together, little red Pustules, that have matter in them of brown, black or lead Colour, Boils, Bumps, Purple Spors and sharp Inflammations.

The Signs of an acid Acrimony, are Sourness to the Smell and Taste, a pale Colour of the Face, the Corners of the Eyes, Lips, Mouth, Gums and Jaws, a flow wasting with Paleness, the Thirst not great, the Appetite often large, Digestion quick, a strong Defire to earthy and absorbing things, Gripes of the Belly with Paleness and Cold, green, sour, griping Stools, the Urine coming flow, thick and white, with a gross plentiful Sediment, much Sweat, and that acid, Laxness of the Skin, and thick and sometimes pale colour'd Blood, sometimes blacker, slight Inflammations, &c.

The Signs of a muriatic or armoniac Acrimony, are falt Taftes, gentle, flow Erofions that are fcabby and leave a Redness, a constant great Thirst scarce to be quench'd, Dryness, Rigidity, salt Urine, flowly putrefying with a thick Sediment, and a thin,

fat or oily Pellicle swimming on the top.

The Signs of an oleous putrefied Acrimony, are an Empyreumatick Stench, a bitter or rancid Taffe, a four fat as from burnt Oil, ulcer'd Jaws, a hot wasting of Flesh, Loathing of Mear, an Appetite quite loft and that with Horror, the greatest Thirst, fat and stinking Excrement that appear very scorching in Evacuation, scalding, fetid, frothy Urine that is little in quantity, a dry Skin and Mouth, Heaviness and Oppression, Inflammations that are acrid, sudden and obstinate, Suppurations of the like nature, and fetid Gangreens, all which are relieved by cooling, acid, watry Remedies.

The Signs of too great a Fluidity, are the Perspiration of Sanctorius, Sweat, Urine and Saliva being too much increas'd, a Wasting, Contraction, Weak-

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ness and Thirst throughout the whole Body, which

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is affisted from inspissating Medicines.

The Signs of too great an Increase of the Hardness of the Body, are Tumors, Pain and Anxiety, the Hindrance of Circulation, Secretion and Excretion, a Lentor of the circulating, secreting and excreting Humours, if attended with a Coldness, shows a pituitous, but if with great Heat, then a gross or hard Instammation, from whence also the Signs of Water, Salt, Oil or Earth predominating are observ'd.

But if, together with the foresaid Signs, all these Signs of Life and a vigorous Circulation appear together, then it declares the quickest and utmost Destruction, but the contrary Signs demonstrate the

opposite.

From weighing all these well together, are understood the Signs of Malignity in acute Diseases; for fince this fignifies the quickest Change of a Disease into Death, these things may be collected, first, From the strongest swiftest Causes apply'd to the Body, as are Plague, Poison, Fire, and Putrefaction or Corruption. 2ly, By Observations from the known violent Nature of a predominant Epidemick. From the known natural and morbid Conflitution of the Sick. 4ly, From an obstinate Resistance or Refusal of all sorts of Medicines, tho' endowed with full Strength to change the Disease. 5ly, From ill Symptoms which show that the vital Actions are particularly hurt or injured, such as are in the first place, unquenchable Thirst, Dryness, Foulness, white, yellow, brown and black Colour, especially furr'd in the Mouth, Nostrils, Tongue, Jaws and Palate, intire Loss of Appetite, a constant Nausea and Vomiting, Hiccup, Pain and great Uneafiness about the Stomach, a continued puking of Serum, Gall and putrid Humours by Vomit, Evacuation of loofe fetid Stools, very much weakening the Fibres, Caruncles

runcles and Membranes that are exercis'd in their Discharge, a very thin, red, frothy Urine, made in small Quantities; cold clammy Sweats about the Head and Neck, a quick, weak Pulse that is hard, uneven and intermitting: Sudden, difficult and obstructed Respiration, with Coughing and Pain; Loss of Sense, Delirium, Raving, no Sleep. but what is labour'd and diffurb'd; Excretion or Voiding of Blood by Stool or Urine; Small Drops of Blood distilling from the Nose; unusual Tremblings of the Tongue, Lips and Hands; strong Convulsions, constant falling down of the Limbs and Head, with a fort of careless hanging down of the Legs and Feet from the Bed; a wild, wandring. fix'd Look of the Eyes; a gathering up or folding of the Bed-cloths, labour'd and follicitous Palpitations, Purple Spots, &c.

Acute Diseases that are to be overcome by Nature or Art, are judg'd so, from the Absence or Want of these Signs; and the contrary, Crudity, Concoction, a Crisis, the Event towards Health, another Disease or Death are the Objects and Signs

of a Prognoflick in Diseases.

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The matter of a Disease which is endowed with that Substance, Figure, Cohesion, Moveableness or Inactivity, that makes or increases the Disease, is call'd crude.

But that State of the Disease in which it is so, is call'd the Crudity of the Disease, which obtains equally as well in Diseases, where the whole Mass is infected, as in those where one Part is over-charged with such a matter; which is the same thing in the Solids.

That Crudity is known, first, from the Vigour of the Disease continuing or increasing. 2ly, From the daily Increase of the Symptoms. 3ly, From the Exercise of the Functions very much impair'd. 4ly, Best of all from the Recess of all the circulating, secreting,

fecreting, excreting and excrementitious Humours, from the found State of the Body as to Quantity or Quality: From whence it is indicated or shown in Sweat, Tears, Mucus, Saliva and Sputum thrown up by Vomit, in Bile, Faces, Urine, Corruption, Blood, Menstrua, Lochia, Milk, an Abscess and in sore Throats.

But if the matter of the Disease being sirst crude, is by the Actions of Life, its peculiar Nature, or proper Remedies so chang'd as to Substance, Figure, Cohesion, Motion, Inactivity, that it recedes less from a salubrious State, does less harm, and therefore lessens the Violence and Strength of the Disease, it is now call'd Concoction or Digestion.

But that State or Condition of the Disease, in which these things are thus perform'd, is call'd Di-

gestion, Maturation, or a πεπάσμο.

That State of the Disease and its matter is known first, from the rest of the Disease and its Decrease, the Strength of Life, in the mean time remaining or increasing. 2ly, From a ceasing or lessening of the Symptoms, with the concomitant Vigour of Life; 3ly, From a Restitution of the Functions whole again. 4ly, From a Similitude or the Likeness of the circulating, secreting, excreting and excrementitious Humours, with the Natural ones.

The Cause that changes the crude Humours into Digestion, is the remaining Action of Life, the affi-

fling Virtue of the Medicines.

The matter of the Disease thus far digested by its Causes, that the likest may escape to the healthful, is call'd a freeing or removing the Disease: That Action is a resolving or loosning, which makes perfect Health, that happens without any Evacuation; supposing the matter benign, the best Nature and good Medicines.

In acute Diseases, which have their Residence in the Humours, the matter of the Disease is so dispos'd, that the greatest Part in a certain or presix'd time, a Cr criti

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time, makes a sudden change of the Disease, to Health or Death, which thorough change is call'd a Crisis, and the very matter thus dispos'd is call'd critical.

The Cause of such a Motion, is the remaining Strength of Life, irritated from the matter of the Disease, endowed with various Conditions, that it may be evacuated, transmigrated or be destroy'd.

If the matter is fit for Evacuation or Change of Place, yet not like to that of Health, it produces a different Alteration in the Motion of the Humours from that Condition, which us'd to be in healthful Bodies, it is call'd a critical Perturbation or Diffurbance.

But those thorough Changes which arise from the Strength of Life, beginning to move, lead round, mix and separate the critical matter, if they are sensible ones, they are call'd critical Symptoms, and are the Signs of a Criss now coming on, or to be hereafter. The Distinction whereof is difficult, and the Ignorance of it full of Hazard.

For they are often confounded with Symptoms from the Cause of a Disease, from a Disease it self, or the crude matter of the Disease, from whence oftentimes follows an unhappy Method of Cure.

But the Signs by which the critical Symptoms are distinguish'd from the morbid ones, are first of all these. 1st, Those Symptoms are rais'd from the Strength of Life, exceeding the Strength of the Lifease, but these from the Strength of the Disease, prevailing over the Vital Faculty. 2ly, Those make their Progress from the Concoction manifested by their Signs, and the Advantage found there, these in the known Crudity. 3ly, Those make a Griss about a proper time, these in every time of the Diseases, especially in the Increase. 4ly, Those are relieved in a short time, these hurt quickly.

Those Primary Critical Symptoms and Signs, are these which precede an evacuating Crisis; after Digestion in a critical time suddenly, without any new apparent Cause of a Disease; a Stupor, Sleepiness, Dullness, Watching, Delirium, Anxiety, a Dyspnoæ, Pain, Redness, Titillation, Heaviness in the Parts, spontaneous Tears in the Eyes, Loathing, Heat, Thirst, Retraction of the Hypochondria, trembling Agitation of the lower Lip.

The Signs of a critical Evacuation are known, if from thence there proceed Vomiting, Salivation, Excretion of Mucus, a Flux by Stool, Urine, a Hemorrhage from the Nose, Womb, or Hemorrhoidal Yessels; Sweat, an Abscess, Tumours, Bubo's, Swellings of the Parolids, fore Throat and a Tran-

flation of Humours from Place to Place.

These Things are known to be salubrious Criles's, if they are not diffurb'd by Art, but are promoted; if Digestion precedes, the State of the Disease and the Strength of a regular Life, than the Excrements are similar to the Natural one, and agreeable to the Disease and the Part affected, to Diet, Age, Sex and Temperament, the time and place, being affifting after these, as well to the Distemper, as the Symptoms; Colour, Heat, Strength, a Pulse, Respiration, and all the Actions are prefently reftor'd, begin to recover, and also a Constancy of critical Evacuation even to the end of the Disease, for if there are all these or more Signs, then there will be a perfect Separation from a morbid State to a healthful one, and this is call'd a compleat evacuating or separating Crisis.

But if those Signs are wanting, or the contrary of them happen, then it will appear that these are the Symptoms of the Disease, and then they are troublesome, and must be cured as the Disease it self, but if all these are not present, but only some and those not persect, then it declares the critical matter that riou F

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is brought hither to be amis, and will produce various Phænomena, which Criss is call'd ustagration.

From hence, the Anxioms in Diagnosticks and Prognosticks and others of the like Nature are received; a critical Evacuation after Concoction is always good.

In the same critical Day it is advantageous.

But it is various according to time and matter, as to the Difference of Age, Constitution, Sex, Climate, Season of the Year, Disease, and Epidemical Temperament.

That will be before Concoction mischievous.

But that Concoction always good.

The quicker the Concoction, the better it is; but

not a Crisis.

The Fore-knowlege, discovering the Event or Consequence of a Disease, is sounded more particularly in the known Causes compar'd amongst themselves, on which depends the Life of the Sick, that is as yet present and remaining, and from whence also the present Disease arises in that; for from these things plainly seen, is sound out the Presage of the Termination of a Disease in Life, Health, to another Distemper or Death; for from these are understood the Times and Permutation that happen.

The Efficacy of the Cause from which Life as yet remains, is known from some certain Function that remains; sirst, Vital, then Animal and likewise Natural; which indeed may be pronounc'd from both these Axioms, by which means, the more the Functions are like to those which us'd to be in Health, thence there is a greater Vigour or Life, and that better, and from thence there is more Hopes of a persect Recovery to Health; for by how much some forever that Function is more salubrious in Sickness, from which several others depend as on their Cause,

it is so much the more serviceable to the Patient,

and fo on the contrary.

But a Function is known to be like that which is in Health, if the Effects being inseparable and sensible, are found to be such as are there requisite; but first, we must learn from hence the Goodness of it, if the Cause, Matter and Effect of the Disease, are converted by those remaining Functions into Health, and that especially from a good Digestion of the morbid Matter and a good Excretion.

The best Digestion is thought to be that, whereby the Crudity is soonest and most compleatly made like that of the Natural Humour: From whence this Axiom; the better the Concoction is made, there

is more Hopes for Life and Health.

And it is known, that the Humours return into a found Condition, and also the solid Parts are restor'd, if certain Actions that are interrupted, during the time of the Crudity are restor'd and made whole again: And if all the Excretions enjoy the Likeness of the sound Parts; from whence these Axioms arise, that the more the Actions become salutary, the better the Concoction is; and again, the liker all the Excrements are to the Natural ones, the more perfect is the Concoction; and so on the contrary.

Laftly, The Strength and Force of the Vital Cause is also known from the Age, Sex, Constitution, Life, Country and Family of the Patient. And from all these, the Physician may gather the Strength

of the Sick, and the Nature of the Cause.

But the Strength and Magnitude of the Cause producing the Disease is known, first, from its greatest, malignant and most obstinate Causes. 2ly, From the observed Disposition of the Disease, by the known epidemical Constitution. 3ly, From the Plenty, Size and Sharpness of the Symptoms. 4ly, From the Crudity or ill Digestion. 5ly, From the great Change of the sensible Qualities, as to Figure, Substance,

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Substance, Colour and Consistence. 6ly, From the Excretions very much receding from Health.

From these Causes exactly known and accurately compar'd among themselves, a Prediction is made by these Axioms.

If the Cause of Life be more efficacious in the Sick, than the Cause of the Disease, then the Patient will be cured in a short time.

If the Causes of Life and the Disease be equal in Efficacy, then there is Danger, Continuation, or another Disease foretold.

If the Cause of the Disease be more powerful than the Cause of Life, the Death of the whole, or a Part follows it.

The Greatness of the Danger in Diseases is likewise regarded by the Excess thereof, whereby the Cause of the Disease overcomes the Cause of Life.

The Duration of that is measur'd by its Slowness, from which the Disease tends to its utmost Height, from the Weakness of Life, from the Stubbornness and Toughness of the matter.

Another future Disease is known from thence, when the Strength of the Disease and its Symptoms remit without Digestion, and without good, sufficient, critical Evacuation, and that in a Disease from matter.

But that succeeding Disease is often worse than the former, and more lasting, according to the Diversity of the injured Part, which that new Disease takes Possession of, or from the Variableness of the new chang'd morbid matter, or only from the Delay of time.

But the Place may be known, which the ill digefled matter of the Difease will possess, from the Itching, Titillation, Redness, Pain, Heat, Swelling, Numbness, Pulsarion, Agitation, and continual Uneasiness of the Patient, as well from the

Nature

272 Of the Pulse, of the Artery, as a Sign.

Nature and Idea, as the universal State of the Disease.

Therefore if it is observ'd, that Art or Accident produces those things in some Part of the Body, as hath been said, then also we may foresee that the matter of the Disease will be collected into that art.

From all these Things it is evident to us, that the Knowledge of Digestion and the Crisis is particularly to be understood; that good Prognosticks may be made on Diseases; and it is plain, these can only be acquired from the known vital Function, as from its special Cause, and this is chiefly gain'd from the Pulse and Respiration: Therefore it will be proper to enquire into these first, and then of Urine, as it is a Recrement from the whole Mass of Blood, and all its Parts, cast out by Vigour and Force of Life, but these require an accurate Consideration.

Of the Pulse, of the Artery, as a Sign.

THE Pulse of the Arteries which declares the definite Condition of the Heart as the first Mover, as also the Nature, Plenty and Motion of the universal Fluid, from whence proceed all the rest; together with the different State of the Artery, the primary Vessels of all the Parts of the Body, is manifest in the Art of knowing the Signs to confirm the Doctrine of Pulses.

Therefore a strong Pulse denotes, first, the muscular Force of the contracted Heart, and so the Essicacy of the contracting Cause, that is, 2ly, the sufficiently strong and plentiful Instux of the nervous Humour, and that of the Cerebellum into the Villa of the Heart. 2ly, Abundance of Blood. 4ly, Circulation and Secretion of the Humours. There-

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Of the Pulse, of the Artery, as a Sign. 273 fore such a Pulse is a good Prognostick, if it is found to be such in the whole Body, and in all the Parts thereof; it frequently deceives in Apoplectick Cases and some others, where the rest are very much obstructed, in their free course from the Heart into the Cerebellum, and from that into the Heart, and first of all in the Viscera.

A weak Pulse shows all things contrary to the former, but sometimes deceives us in those Persons,

who are very fat.

A large Pulse declares 1st, Plenty of Blood. 2ly, Strength of the Heart. 3ly, A free and contractile Artery. 4ly, A good Circulation and Secretion; a flow Pulse signifies the contrary; hence a full and empty one may be understood, as they are truly observed.

But a noted hard Pulse hath various Significations, as first, that the Membrane of the Artery is dryer than naturally it should be, and therefore, 2ly, there are Obstructions in the minute Vessels, that constitute the Membranes of the Arteries. 3ly, The Arteries are full, but 4ly, obstructed at the Ends of the Capillaries, with an inflammatory Hardness. 5ly, The Blood is very dense and compact, hence 6ly, The Circulations, Secretions and Excretions are interrupted. 7ly, All those numerous little Vessels which follow from these, but a soft Pulse shows quite the contrary, yet deceives us especially in an acute Peripneumonia.

A Pulse that is rare or seldom in a certain stated time, declares 1st, that the Contractions of the Heart are slower, and from thence, 2ly, there is a slower Instux of the Cerebellows Fluid thro' the Nerves into the Villa of the Heart. 3ly, An equal and affisted Circuit of the Blood. 4ly, An easie Circulation of the Humours thro' all the Vessels. But if such a Pulse proceed from Weakness, it is of ill consequence and dangerous, but a more frequent Pulse

denotes the contrary, as irritating Acrids, the Agita-

tion of the Spirits, Fevers and Frensies.

A Pulse of equal Strength and Frequency is good, and declares the Constancy of Life; the unequal one therefore bad.

The intermitting Pulse is pernicious, and denotes

the fading Strength and Vigour of Life.

A strong, large, even and slow Pulse together, is the best of all, strong and large, strong and slow; large and slow together are good, weak, small, hard, unequal, intermitting and free together, is the worst of all; and always still worse, as more of such like

Symptoms meet together.

From the Doctrine of the Pulses, we may understand of what Importance Heat is, because it is an Effect of the Pulse; for it denotes, that the Vessel is bound or constring'd, the Humour is dense, the Propulsion of the Humours strong, the Resistances are great about the Ends of the Vessels; from whence the Heat being lessen'd shows the contrary; and Heat and Cold are known as to the Diagnostick and Prognostick.

Yet it ought to be remembred, that the Nature of a fingle Artery, Age, Sex, the Affections of the Mind, the Six Non-naturals, the Habit of the Body, proper Temperament, Climate and Season of the Year, can wonderfully alter all these. But the Pulse is accurately to be observed, as it is the Index of the morbid Matter, of Motion, Secretion and

Excretion.

Of Respiration, as a Sign.

N easy Indolent but constant Respiration or Breathing in Diseases, always denotes, that all the Organs contributing thereto are well; that the Lungs can easily expand, the Blood readily circulate,

culate, and is therefore fitter to flow thro' all the Vessels of the Body; this is crrtainly a good Sign; on the contrary, difficulty of breathing is constantly a bad one.

But that Respiration which is also very painful, for the most part declares some internal Inflamation,

and is always an ill Sign.

A large Breathing constantly shows, that the Breast is very much dilated of it self, the Diaphragm moveable, the Abdomen extended, the Blood is easily pass'd thro' the Lungs, and the Strength is good; all which betoken well in Diseases.

A small Respiration signifies the contrary to the former, but especially it shows that the Lungs are very rigid, either with the Blood that will not pass or some other matter; or else that the Pulmonary Pipe is stopt with some Tumour or other Thing, so that the Air can scarcely be received in; this is a very Bad Sign.

A flow Respiration demonstrates, that the Lungs are equally free and expansible, the Blood enters the Parts, and the Pulse is equal: This is a very good

Sign, if there is neither Pain nor Delirium.

A quick Respiration denotes, that the Organs of Breathing are hurt; the Lungs are obstructed, rigid, dry; the Blood not in a Condition to flow thro, and therefore we ought to be under fearful Apprehensions.

An equal Respiration predicts, that the Lungs are good, the Organs right, the Blood well digested, which are good Signs, but uneven, or irregular Breathing, denotes Life is in Danger, and there is

an ill Sign.

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To take Breath as if a Man was choaking, which creates in the Sick a Sense of Strangling or Suffocation, shows that the Lungs are inflam'd, obstructed, full, rigid and dry; that the Blood does not circulate, whence in a short time it becomes mortal, unless it

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be such a one as arises either from a light spasmodick Cause, in Hysterick and Hypochondriack Cases, or from a common one in Asthma's.

A Respiration acting on the Top of the Breast, shews the worse Condition of the impleted Lungs,

and therefore Danger of Life.

That is most sublime, which is perform'd by the Elevation of the Clavicles, the Agitation of the Breast, the Motion of the Scapula, the short drawing in of the Sides of the Nostrils, the Inserior Ribs and Abdomen, which being work'd strongly together is mortal; for it shows a very difficult Motion of the Blood through the Lungs, and also Want of Strength.

An easy, large, slow, equal, reviving Respiration, perform'd only by the gentle Motion of the Intercostal Muscles, those of the Diaphragm and Abdomen, is extraordinary healthful; but that which supplies the

most of these Symptoms, we esteem the best.

A difficult, painful, small, quick, panting, unequal, suffocating high Breathing, exercised with all the Strength of the Muscles growing to the Ribs, is undoubtedly Mortal; but that which hath the most of these ill Symptoms is so much the worse, because it carries the more of them with it.

A cold Breathing is mortal, confidering it is always the Fore-runner of a Gangrene of the Viscera, and

other internal Veffels.

A small Respiration with a whistling Noise and Heat, as it were in the Lungs and Throat, is quickly Mortal, if there remain any more Signs, that are dangerous; it signifies that the Vital Fluid passeth not thro, but is collected there and thrown upon the Lungs.

A large and quick Respiration is often a Sign of Health, and the Cause of a good Digestion and Criss.

But one that is large and rare declares the Brain to be obstructed, and the Diseases made from thence present present or future; to be a Coma or Drowsiness, Le-

thargy and Delirium.

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In the interim we ought rightly to consider, that Respiration is very disorder'd and different, in different Persons, according to the Nature of the Constitution, the different Formation of the Breast, Lungs, Diaphragm, and Abdomen; the Diversity of Age, Sex, Bulk, Affections of the Mind, Habit of the Body, Climate, Season of the Year, Weather, and the like.

The various Order indeed, by which the received Changes or Alterations of Breathing mutually vary themselves, affords a great deal of Light to the Diagnostick and Prognostick Rules; for the Change from bad to good is best, but from good to bad the worst; but at the time the Crisis rises, the best.

Therefore because one Respiration declares to us the present State or Condition of the Heart, Lungs, Blood, Liquor of the Cerebellum, the Pleura, Breast, Diaphragm and Abdomen; it is plain, that an accurate Observation thereof is of the greatest moment, especially in an acute Disease, to prove the Prognostick and confirm the Diagnostick Part.

Of the Urine, as a Sign.

Rom Sight of the Urine, a Judgment may be made of the Condition of the Body. 1st, The Urine of a found Man in it self, and comparing it with others, is different according to the Difference of Age, Sex, Temperament, Season of the Year, the Six Non-naturals and Medicines. 2ly, Therefore in passing Judgment of Urine, we are to have nice Regard to other Signs, appearing in Diseases; or otherwise this Art is very full of Fallacy or Deceit.

In examining the Urine, that it may be serviceable to the Physician, to make his Diagnosticks or Prognosticks by, the Quantity, Colour, Smell, Taste, Fluidity, and Contents Inherent therein is consider'd.

The Quantity of Urine increas'd more than usual shows, something of these following either singly or all together: 1st, Abundance of watry Drink. 2ly, The particular Laxness of the Renal Pipes. 3ly, The lessening of Perspiration, Sweat, Saliva. 4ly, The taking of Diureticks. 5ly, An impersed Mixture of Blood, by which the aqueous Part easily departs from the rest. 6ly, Nervous Affections, an Hysterick Temperament, or an Hypochondriack Disease.

Such Urine as this shows the Remainder to be thick. 2ly, The Acrimony of it. 3ly, Thirst. 4ly, Anxieties. 5ly, Obstructions and their Effects. 6ly, A Consumption from a Diabetes, which occasions Dryness and burning Heat.

A less Quantity of Urine than usual, signifies 1st, a Sparingness of Drink, or too great Plenty of Spirits, produced from Fermentation. 2ly, The Vessels obstructed or contracted with a Spasm. 3ly, An Increase of some other Excretions; but if it is intirely intercepted, it denotes an Ischury, and the various Causes thereof.

Such a Secretion of Urine presages, suture Repletions, Heaviness, Stupidity, a convulsive Trembling and Apoplexy, especially if it arises from Obstructions.

A thin and as it were watry, limpid, colourless Urine, that is insipid, without Smell, and slows plentifully, shows 1st, that there is abundance of Water or aqueous Liquor drunk. 2ly, That the Renal Vessels are constring'd, while yet the Humours are strongly agitated. 3ly, That there is a close Cohesion of Oil, Salt and Earth in the Urine it self, like-

likewise a Tenaciousness of these, and difficult Mixture of the watry Part with them. 4ly, Enormous Affections of the Mind, Hypochondriack Insults, Green Sickness. 5ly, The Viscera unapt for Digestion, Crudities, Flegm and Cold. 6ly, Obstructions of the Viscera and Vessels. 7ly, But in acute Diseases, it marks out the Impediments of Concoction and a Crisis, and the driving of the morbid matter into the inward Parts of the Body.

But in acute and inflammatory Diseases, such Urine foretells the worst Condition of the Viscera, Deliriums, Frensies, Convulsions and Death, proceeding from a Gangrene, by reason of the retain'd

Acrimony.

A red Urine without Sediment in acute Diseases, teaches 1st, a strong Motion of Attrition betwixt the Parts, constituting the Humour, the Vessels and Humours themselves. 2ly, An intimate and tenacious Mixture of Oil, Salt, Earth and Water in the Humours. 3ly, Hence therefore a great Crudity or Indigestion of the Disease. 4ly, A long suture Duration of it. 5ly, Great Danger therefrom.

But this Urine presages, 1st, gangrenous Destructions of the minutest Vessels, especially in the Brain and Cerebellum, and from thence Death. 2ly, A difficult Digestion. 3ly, A flow Criss, and that very ambiguous; but all these appear the worse, the redder the Urine is, and also the more without Sediment.

Hence a thin Flame colour'd Urine without any Sediment, shows the same thing, but more violent, from whence comes the same Prognostick, but much

more dangerous.

A red Urine together with a copious Sediment, that is heavy, looks red on the fides of the Veffel, and is like Bole, shows that the foregoing Motion of Nutrition was vehement. 2ly, The Veffels lax

3ly, The Blood, Acrid, Saline, and unfit for Nourithment. 4ly, Intermitting Fevers, that have had strong Paroxysms. 5ly, Scurvy, in these Northern Parts.

It presages 1st, the Length of the Disease. 2ly, The Attrition, Weakness and Destruction of the Vessels. 3ly, Sweats, Urine, Saliva, Diarrhaa's, Colliquative Sweats. 4ly, An Atrophy. 5ly, Some Sort of Dropsies.

If in such Urine, the Sediment is branny or rough,

it denotes the same indeed but much worse.

But if the *Urine* is of a Saffron Colour, that will strike a Tincture or Colour in the Glass, and have such a Sediment as the last mentioned; it betokens the yellow Jaundice, and the Symptoms are certain and evident in the Skin, the Stools, *Hypochondria*, and throughout the Body, from whence clear Prognosticks are derived, from the History of that Disease.

A green colour'd Urine together with a gross Sediment, signifies 1st, that the Temperament is atrabilious. 2ly, That the soluted matter thereof is excerned. And therefore, there are Oppressions about the Heart, Costiveness of the Excrement, Iliack and

Cholick Pains.

Such Urine foretells, that the atrabilious matter being dissolved and moved, passes into the Blood and Viscera; from whence are infinite and acute Diseases, which may be traced from the History of this Disposition, of the melancholy or black Bile; and also from these Things we know, what we are to think of black Urine, that is of much worse Tendency.

Blood, Pus, Caruncles, Filaments, Shreads Hairs, grumous Slime, Gravel, Parts of Stones, a Mucus in the bottom of the Urine, set forth the Vices of the Kidneys, Ureters, Bladder, Testes, Seminal Vesicles,

Proftata, Cowper's Glands and Uretbra.

But

But what the Nature of the Evil is, that is shown by the said Symptoms, and what Place or Part is affected, the concurring Signs ought to teach us, that are observed in that Disease, where the said Things are produced.

Fat appearing in the Urine, often brings with it small Sands or Gravel invelop'd in the viscid part, and create a kind of oily Membrane, which denotes a great deal of Earth and fluggish Salt in the Blood, which foretells the Scurry, Stones and the like.

But Urine that is very fat and oily, certainly very rare if ever observ'd, shows, sirst, That the Vessels are ground in pieces by too great Motion, hence dissolved, mixed with the Blood and excreted with the Urine. 2ly, Acrid Humours, and therefore it will threaten a Phthisick and an Atrophy.

Urine, that being shak'd holds the Froth long upon it, denotes that the Oils and Salts are mix'd and dissolv'd into a soapy Lixivium, and therefore shows, first, The Tenaciousness of the Mixture. 2ly, The Dissiculty of the Digestion and Criss. 3ly, The Diseases are almost pulmonick and catarrhous in the Head.

An Urine that is naturally fetid, shows, the Salts and Oils are attenuated, dissolv'd and almost putrefied, hence arises the greatest Distinction, as well in chronick as acute Cases, and the Cure not easy to be effected.

Urine that appears colour'd, but yet hath no Tasse or Savour, confirms the broken Strength of Nature and the Approach of Death.

A pale thin *Urine*, with a mucous slimy Sediment and putrid Saltness, is almost always a Mark of the Stone in the Bladder.

In Fevers that are acute, the Urine is first to be consulted, as being a sufficient sure Prognostick: For first, The Urine that hath a white, light, smooth even Sediment, that is muddy, quick, subsides and scarcely

scarcely smells at all in the wholeCourse of theDisease to the very Crisis, is the best Indication and Forerunner. 2ly, Much white strangurious Urine, with a plentiful Sediment that is white and discharg'd at a critical time, heals and takes away the Abscess. 2ly, A large quantity of Urine in the critical Day. with a white or reddish Sediment that is plentiful and light, denotes in the critical Day a Cure from a perfect Criss. 4ly, A thin and reddish Urine that subsides not, a white, thin and watry one, a yellow thin Urine that is not muddy, or a muddy one that remains so and breaks not, show that the Digestion is very much impeded in acute Diseases. there is a great Crudity, a difficult Criss, the Difease will be long and there is the utmost Danger of Life; but in acute inflammatory Cases, it portends almost certain Death; lastly, in moderate acute ones, it betokens a long and tedious Disease; from whence perhaps a various Abscels or a Metastaf of the Disease.

Therefore the Urine declares to us first, the Nature, Force and Symptoms of the Blood. 2ly, The State of the Disease and of Digestion. 3ly, The Condition of Secretion and a Crisis. 4ly, The Diseases of the Kidneys, Ureters, Bladder, Testes, Vasa deferentia, seminal Vesicles, Prostata, &c. 5ly, Some Complaints arising in the Bile, the rest that are taken from Urine alone, are all uncertain and very ridi-

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culous.

ΥΓΙΕΙ' N H, Or the Hygieneal Part of Physick.

There are Three Offices or Duties of the Art of maintaining Health in its found State or Condition; to wit, to preserve Health that is prefent,

fent, to prevent Diseases that lurk in the Temperament of the Body as a Seed, and that is easily rais'd from thence; and lastly to dispose Life so as

to last or endure to Old Age.

For Health, since it is an Aptitude or Fitness of the Body to exercise certain Actions, and since this consists in a determinate Motion of the Parts, as well Solids as Fluids, it is necessary, that this very thing I call Health, if it is once made perfect, shou'd from its own Nature wear away the solid Parts, consume the Fluids, break both and consequently destroy its very self.

Hence Health is preserved by constantly restoring the same quantity and quality of all the Parts in the Body, such as they were before the described De-

struction in the solid and fluid Parts.

To this Restitution, Meat and Drink and perhaps Air affords some Matter, hence they prepare and adapt the Aliment in the Body by vital, natural and animal Actions; they apply what is prepared, to requisite and proper Places; and lastly, by these it is freed from supersuous undigested and hurtful things.

Wherefore it is plain, that this whole Art of maintaining Health, being placed in the Description of Laws or Rules, which describe their definite Use; yet it is difficult to promulgate these Laws, that the Observation of them may equally profit every Man.

The Cause of which Difficulty as it chiefly lodges in the Idiosyncrasy, therefore it often performs contrary Effects in Men, who yet follow the same way or method of Living; so that perfect Health may be kept by every one, altho' they use not only different but quite opposite ways of Living, than what is prescrib'd in the Use of the Six Non-naturals; when on the contrary, shou'd they change their way of Living, tho' for the better, they wou'd run into a sickly or unhealthful State.

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Also Custom it self, which they do not call amiss a second Nature or Idiosyncrasy, produces what is scarcely to be believed, if we consider the Effects of the Air, Meat, Drink, Motion, Medicine, Poison, &c.

Wherefore a sudden Change from things accuftom'd, into Novelties, is always and in all places very dangerous, tho' we shou'd alter from ill Customs

to fuch as were reckon'd good ones.

But gradual changing, and frequently to vary the daily Course of Life, is of vast Service to the

Maintenance and Support of Health.

The Air that is always heavy, but yet serene and dry, is esteem'd salubrious in every Place: The Effects of it are various, being savourable or hurtful in its Nature, when we inquire into the secret Caufes of Health.

The Qualities of the Air, from their Excess producing Diseases, may be remedied by opposite Inductions; for the cold and moist may be chang'd into hot and dry by the Help of Fire, by dry aromatick Woods, by the Fumes or Smoke of fragrant Fuel, by the admission of warm Air, procured by Art, but if the Air is offensive by Heat and Dryness, it is rectified by the Exhalation of refrigerating things, after an artificial manner, or from the drawing up of watry Vapours from cold Plants, as the Sallow, Popular, Rose, Elder, Mulberry, &c.

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Therefore a serene heavy Air, temperately hot and dry, breath'd in from Inland Parts and fresh Rivers, agitated by a gentle Wind, not liable to sudden and great Changes, but open and expos'd to the Sun Beams, being free from saline and oily Exhalations, is the best in general for Preservation of

Health.

But that Diet is esteem'd the best, which is the most simple and least seculent, void of all Acrimony, and

and scarce endowed with any great Motion of Parts, most like to the healthful Temperament of the Body, or at least most easily assimilated to it by the Assistance of Digestion, and is prepared to be capable of performing the foresaid Offices by the culina-

ry Art; this is call'd Kitchen Physick.

Such as every thing that is chose, first, From Grain, as Corn and Flower that is clean and moderately dry, yet fresh or new, as Wheat, Rye, Barley, Oats, Rice, &c. which by Grinding, Sifting, Fermentation and Boiling or Baking, is so prepared, that from its grateful Tafte and Smell it is recommended under the Name of Bread, &c. 2ly, From Leguminous Fruits, as well Seeds as the like, as Pea's, Beans, Lentils, Vetch's, &c. which are prepared as the former, or elfe by bruifing, pounding and boiling. 2ly, From fresh green olerant Herbs, by gathering their tender young Leaves, &c. as Lettice, Spinage, Succory, Purslane, Sallery, Parfley, Sprouts, Beets, which are prepared by stewing them in their own Juice by gentle boiling. From Fruits whether more folid as Nuts, Almonds, the Bulbs of Turnips, Potatoes, Artichokes, or from Roots of Carrots, Parsnips, Radish, Beet and the like, or from the fofter kind, as Apples, Pears, Berries, Plums, Cherries. 5ly, From the Juice and Substance or Flesh of a young found Animal, whether it be Quadruped, Bird or Fish, either Insects or Testaceous, if they be prepared by Broiling, Frying, Roafting, Boiling or Baking, to which also we refer Eggs and Milk.

Hard, dry, gross, ponderous feculent Food, are proper for such who want the Viscera to be strengthen'd, the Digestion quicken'd, the muscular Motion greater, and the Humours more agile in Health; but the soft, moist, thin, light and pure Aliment is opposite to those, and always sit to supply the

Table.

But those Persons whose Viscera are weak, Digeflion difficult, and who enjoy a quiet, sedentary idle Life, ought to have such Food as is made by Art or Nature most like to the diluted Chyle.

In an alcalifate Temperament, such things as are sharp and four agree, in an acid or four one Alca-

lies are profitable.

From which few things, the whole reason of our Choice of the Quantity and Preparation of Aliment depends; if we first know the Use of the Viscera, the Humours, Constitution, Age, Sex and Manner of living.

The best Quantity of Meat or Diet to every one is, that he only pursue the Refreshment of his Appetite, not the Dulling or Clogging of it: Sobriety is fafeft to the weak, Excess better to the firong.

Sauces or Pickles from Acids, falt and aromatick Spices, do Injury to the healthful by their noxious Acrimony, which wound the finer Vessels, and by a falle Appetite rais'd by flimulating the Parts, they

load the Body rather than nourish it.

The Goodness or Usefulness of Drink is to be understood from the same Rules, for if it is required to quench Thirst or remove a Dryness and a Thickness of the Humours, and to qualify the Acrimony thereof; then cold, clear, light, running Wa-

ter from pure Springs or Rivers, is the best.

But if Drink is required, to the Intention that it may warm and stimulate to Motion, and attenuate the Humours, then well brewed Malt Liquors that are kept till they are fine, are proper, as also sprightly neat Wines that are fragrant and grateful; but the Choice, Quantity and Use of them must be determined by the State and Condition of the Per-Ion that drinks them.

Meats that are the least fat, and the drinking of Water renders the Body firmest and strongest.

The

The Prophyla Elick or Preventing Part of Physick. 287

The Motion of the Body from the Beginning to the End of a gentle Sweat, or even to the Perception of the approaching Weariness after Digestion is begun, with a Sense of Lightness, is best; from whence the regular Method of Rest is taken.

The time of Sleep, when the Body sleeps found, is best measured by the Agility and Briskness of the

Body when awake.

All Medicines, either evacuatory or acrid, by whatfoever Title diftinguish'd, are always to be avoided.

The Purgations or Cleanfings of the outward Skin by Frictions, Lotions, Baths, Fomentations, Swimming and Detersions are of excellent Use.

But the Affections of the Mind or Passions are not altogether to be suppress'd, neither too much excited or stir'd up, for it raises a Stupidity or turns the Circulation: Hope and Desire are found to be salutary to the Body.

ΠΡΟΦΥ΄ΛΑΞΙΣ. The Prophylactick or Preventing Part of Physick.

Discases are prevented, when at the same time the first Signs of their future Approach are discover'd, and you presently have recourse to their Causes.

But the primary Prophylactick Remedies of Difeases rising suddenly, are indeed these; Abstinence, Rest, warm Liquors, then gentle and sometimes constant Motion, till a breathing Sweat is rais'd, afterwards a large Sleep or Rest with the Body being well cover'd; by this means the gross or thicker Fluids are diluted, the Vessels relaxed, and the noxious Humours excerned.

Neither

Neither is there any thing else, that defends the Body better against the Force of external Causes, than if any one in Spring time casts off his Winter Cloaths by degrees, and again increases his Summer

Wearing early in the Autumn Season.

We ought also to moderate our Diet at certain times, which may be done by these sew simple Rules: In Summer, a light, soft, loosening, moist Diet is proper, of olerant Herbs, Fruits, Milk, Broths, with plenty of aqueous or diluting Liquors, and with gentle Exercise of the Body avoiding all that is violent.

In Winter, a folid dry Diet is best, that is acrid with Spice and Salt, roasted Meat, Bread more baked, with a sparing quantity of pure unmix'd Wine,

and a more vigorous Exercise of the Body.

In Spring and Autumn, your Diet is to be moderated in a middle Temperament betwixt Summer and Winter; confidering likewise into which of these Seasons you more or less incline.

Diet to prolong Life.

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A Thorough found Body, by Actions that are inseparable from a healthful Condition of Life, by degrees is so chang'd, that the smallest Fibres become rigid or stiff, but the finest Vessels grow into concreted Fibres, not pervious to the Humours, the larger Vessels harden and close, but they are all drawn together, growing each to the other, from whence comes Dryness, want of Motion, and a Decay of Age: Here the Offices of the little Vessels are destroy'd, the Humours stagnate in them, move slowly and coalesce among themselves, and with their proper Canals dwindle away; Digestion is weaken'd, Reparation wanting, the gross Humours run slowly, only thro' the larger Vessels, and main-

tain Life fingly without its Animal Actions; from whence at last, Death in Old Age becomes inevitable thro' these Changes, and slows even from Health it self.

Therefore this sooner happens, if the Actions of a healthful State and Condition have been more violent, but later if they have been moderate: And in the Moderation here of a just Mediocrity, Old Age seems to be promis'd as possible to be attain'd by Art, especially if the Hygieneal and Prophylastick Part conspire so by their Esfects, that they do not interrupt or molest this Design; almost all the rest return hither, if they have been gather'd together.

All these Conditions ought to be join'd to the Body, as much as that can be gain'd by any Art: The Actions of the Body being thus instituted, that the Reparation of what is lost or expended, the Assimilation of what is taken in by the Mouth, as Meat and Drink, the Term of a requisite Encrease, the Expulsion of the Faces, are easily, gently, and constantly made, from whence moderate constant Labour is serviceable upon a slight Lassitude or Weariness, being more gentle in Childhood, increasing by degrees with the Strength of the Body, and decreasing continually in Old Age.

Those Operations or Workings of the Mind, are to be chose which are most agreeable to every Man's particular Genius or Inclination, but these are to be directed, that by preserving a Moderation, the Spirits may not be stupished or numb'd with Rest, or dissipated and wasted by too much Motion; in Youth sharp Contention shou'd be forbid to be exercised except by degrees, and which sensibly increa-

fing in Age, is more to be moderated.

Simple Food that is dry, hard, tenacious and difficult to Putrefaction, but not acrid; Vegetables, as Bread, Roots and auftere Fruits; lean salted Meat of Animals, or Fish prepared after the same manner, have

have been approved. In Childhood, Milk, by degrees Bread, then more solid Food is administred, whereby Age grows to be more strong, and at length returns by degrees to the Diet of Children

again.

A sparing Draught of good cold Water, serving only to dilute and quench Thirst, is commended for the greatest Example of producing these Effects: Ripe, sine, soft Malt Liquor and Wine may be admitted with moderate Use, but too much is hurtful. In Youth, Milk, by degrees things more diluting, then Water in the Vigour of Age, but in Old Age a little soft Wine may be admitted.

In the interim, the greatest Abstinence, the most accurate lean Diet, rarely or now and then inter-

pos'd, are of wonderful Use.

When Age increases, the Introduction of Nutriment, by applying Externals, is made from Vapours or Fumes, Fomentations, Baths, Clysters, Unguents, &c.

A pure, campaign, mountanous open Air, as well as a shady one in Woods, and that more cool in

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Islands, is commended before all others.

The Excretion of gross Humours about Old Age, is to be affished with greatest Safety by those things which most excite the Fibres, and loosen the Faces; where Saffron, Salt, and Aromaticks are mix'd with

Honey and good Wine.

The Changes of the Humours that are almost radical by Resolvents, from thence the succeeding Excretions of them, as the received Cures by the virtue of Quick-silver, or by attenuating, drying, sudorifick Diet Drinks, often dispose the Body to a ready Expulsion of the old and the Restoration of a new vital matter, from whence prudent Art by this means conducts us to long Life.

Vapours, Fomentations, Unquents, Baths, Clysters, from sweet Odours, from Milk, Broth, Oil, living The Therapeutick or Methodical Part, &c. 291 living Animals, that are egregious Remedies for aged Drynefs, Checks to Death and Helps to long Life are wer injurious to Youth

Life, are yet injurious to Youth.

But yet from what hath been said, it is plain, that those things which render the Body large, hard, constant and fit to bear Age, and keep off the strongest Diseases, and especially the Sharpness of the most sprightly Wit from being dull'd and impeded in the ruder Organs are not the Causes of gaining perfect Health, or Helps to procure long Life.

But the vainest Boastings, without any Foundation in reason, or Faith of Experiments, are those firm Promises which are recommended to this end; to wit, the Use of Helmont's first Ens, the Elixir Proprietatis of Paracelsus, the fam'd Tincture of the Adepts, the first Ens of Metals, Fossils, Animals, Vegetables, the repeated Purges by the Leaves of black Hellebore, Spirit of Sulphur by the Bell, Spirit of Flowers of Rosemary, the attractive Virtue of a Spirit drawn from the Body of a sound young Man, of long-liv'd Animals, &c. for renewing the Parts, as also Sigils of Planets producing Life.

Neither is it very likely, that we can by the best method protract Life to numberless Years, as the Chymical Adepts wou'd make us believe; nay, all these things are consuted by their own Experi-

ments.

ΘΕΡΑΠΕΥΤΙΚΗ. The Therapeutick or Methodical Part of Healing.

This last Part of the Institutions of Physick teaches us general Precepts, which set forth how a Physician in the Cure of the Sick may acquit himself of these Four Duties: First, to preserve Life, 2ly, to take away the Causes of a Disease, U 2

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292 The Therapeutick or Methodical Part, &c.

3ly, to remove the Disease it self, and 4ly, to expel or drive away the present Effects of the Disease.

That these Four may be perform'd, the Body of the Patient ought to be chang'd; wherefore there are Instruments required, from the Efficacy of applying which, the necessary Alterations are made; and these are call'd Helps, Remedies, Succours or Medicines.

But these Remedies are apply'd to every particular Patient so, that there may be made a necessary Change in him; wherefore the Physician ought to know first of all, what ought to be chang'd in him, and then by what Assistance he is to do this; and therefore he ought to know the Esseds which will follow from these Applications on the Patient; both which can only be learnt from those things which are known to him in the sick Person by his Senses, or by accurate reasoning, that from thence he may behold the Action sought for, and the Remedies for it.

That very thing, whatever it is, that is thus discovered, so instructs the Mind of the Physician, that it is called *Indicans*, disclosing or detecting a thing; but the Intellect of the thing known rais'd in the Physician, is call'd an *Indication*; and that which is known to be done, is call'd *Indicated*.

The indicating matter may be all that which is known in the fick or about him, present, past or to come, so that it produces this Knowledge wherefore it is found manifold.

Yet all that may be affign'd, first, To Life remaining in the sick Person, the Causes thereof, its Nature, Consequences and Degrees. 2ly, To the Disease present in that, its Causes, Nature, Consequences and Symptoms.

For from all these the Physician learns, first, What is to be done that he may preserve the present Life;

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that he may recruit or restore what is lost; and that those things may be removed which destroy Life, or is able to lessen and abate it. 2ly, What Instruments are to be chose for this Work, how they ought to be adapted and apply'd in certain Order and Time.

Lastly, That Part of Therapeuticks which sets forth Rules, by the Demonstration of which, the things indicating and indicated may be detected, is the Method of Healing, of which here follows a short

Compendium.

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The Method of Healing.

Life continuing in every Patient, also the Cause and Effect thereof remaining; these things are call'd natural, according to the Laws of Nature, and oftentimes Nature it self.

But fince Life always acts, there will be in the Sick some Actions exceeding which at first accompanied Health, and therefore may be judg'd the Remains of former Health and the Effects of Life present, which may pass under the Name of Strength.

Which being rightly examined, are found to depend on the Motion of the Humours abounding thro' the Vessels, whatsoever that Motion hath been.

But that reduced to the least things possible, at least pushes on the Motion of the Humours circularly thro' the Heart, Lungs and Cerebellum; in which consists the minutest Strength of Life, which also from hence may be augmented in various degrees.

This evidently appears shou'd be known and discover'd by the Physician, towards the Preservation

of the Sick, and restoring him to perfect Health; which Knowledge also is call'd a vital or conserva-

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tory Indication.

The Cause of a Disease being known, indicates the Correction or Removal thereof: The first Cause is judg'd from its Estect, and therefore this Indication is call'd resources or Preservatory, as giving a turn to an approaching Disease, by eradicating or taking away the Cause.

But a present visible Disease indicates, that it should be removed; which Indication is call'd Cu-

rative or Therapeutick.

Lastly, the known Symptoms, if they are so dangerous and troublesome, that the Cure of 'em cannot be differ'd, till the Disease on which they depend can be healed, they indicate a Mitigation and particular Cure; and this Indication is call'd an urgent, necessary or palliative Cure.

From whence now it is evident, we cannot indicate how to act and do right, unless we know first of all what Life is, the Cause, State, Strength and Effects thereof; and also from the Survey of a Difease, its Cause, Condition, Strength and Effects.

Then likewise must be indicated what is to be done, and from thence by what means, with what

Dose, in what Condition, Time and Order.

But since all these Particulars are in one and the same Patient, so that every Particular indicates what is singularly to be done, and also they show the singular Helps that are to be apply'd; it often happens that one of these indicate some other thing than the Rest, and sometimes requires that something contrary shou'd be done, or some Remedy given that is quite opposite to what was required by another Indication. Therefore this is an useful and celebrated Doctrine of indicating, contra-indicating, repugnant, permittent, co-incident, &c. which may be easily understood from what hath been said.

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Therefore when it happens that Contraries meet together, the Physician's best way is to have recourse to medicinal Axioms, which determine him what he is to do or choose from doubtful things, therefore they remove this otherwise seeming Difficulty, after this manner.

1. Whatever is indicated in the Sick, that requires Confervation or Ablation.

2. Whatever is found according to Nature, that is always to be preferv'd.

3. Whatever is discovered contrary to Nature,

4. It consists of those things with which the Body is nourish'd.

5. Like things are to be preferv'd to like.

6. The Cause curing by Medicines is Life exceeding the Disease; and a Temperament proper to every one, without which, Medicine is a sluggish and unactive Nothing.

7. Therefore where a vital Indication offers, and also what attends it, there will always be what will satisfy the first.

8. But where an unequal Indication urges likewife, then it will be always enough to satisfy the greatest.

9. Those things that do good and harm, are particular Indications.

10. Contraries are removed by contraries.

11. Nature is pleas'd with things accustom'd to, and bears the contrary with great Uneasiness.

12. In the greatest or strongest Diseases, the strongest or most efficacious Remedies are to be tryed, and that speedily.

13. In milder Diseases, the most gentle Medicines

are to be given leisurely and often.

A Vital Indication.

THE Condition of Life is known from regarding the Strength thereof.

These are discover'd by the Effects of it ex-

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ercis'd in the fick Body.

Which are the furviving Use of the Functions as ver remaining.

But these are the Propulsion of the Humours

thro' the Vessels and the Viscera.

In which there is required a due quantity of apt Humour, and a continued Action of this thro' the

Vessels themselves.

The Action of the Vessels alone depends on that Contraction of the Fibres, by which these being drawn aside from the transsluent Humour, and distended arch-wise shorten themselves, being disposed into right lines, they approach towards the Axis of its Cavity, and propel the Humour contained in them; therefore these are properly the Strength of the Vessels variously determined according to the Figure of them.

But it appears that these require the elastick and contractile Force of the Fibre, which is resisted or

oppos'd by its Separation.

And likewise they expel by the vasculous Membranes of the larger Vessels, and Inslux of subtil Humour moved into the smallest nervous Vessels, and others alternately, according to the Pulsation of the grosser Humours by the largest Vessels.

Cardiacks and Diet for the Sick.

BUT fince the Heart is the principal Cause of all those Motions on which the vital Stamina depend, hence those Helps or Affistances which do good

good and bring Relief to the vital Indication, are with some justice call'd Cardiacks, tho' they do not

immediately relieve the Heart alone.

We shall find these to be various, but yet they may and ought to be reduced to certain Classes, to wit, first, some of them restore a due quantity of sound Juices in the Body: 2ly, Others give a vigorous Strength to the Tone of the Fibres, and procure to them a requisite Elasticity. 3ly, And some of them increase the Quantity and Motion of the nervous Juice, that from the replete minute Vessels, the larger may be strengthen'd and confirm'd. Lastly, They stimulate the moving Fibres, and so move the unactive Vessels and sluggish stag-

nating Humours.

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To the first Class of these I refer the Liquors that are first; endowed with a Faculty of nourishing the Body of the Sick. And 2ly, those that are so prepared before-hand, that they shall not stand in need of chewing or Digestion, either in the Stomach or Intestines, which is wanting in the weak and exhausted Patient, or at least operates too slowly. aly, They consist of such a matter, which does not easily corrupt or putrefie of its own accord, when it wants sufficient Strength to expell it quickly, because the Actions of the Viscera are weak at this time, or while fomething of a morbid and corrupt Humour is mix'd with the Aliment in the Body. 4ly, And lastly, that they be not of such a Nature, as is similar to the morbid Humours in the sick Body, and which feeds and increases the Malignity and the Cause of the Disease, and produces the Symptoms thereof.

Such Cardiacks are indicated to be administred to the Want of Strength, together with the Signs of the

Emptiness of the Vessels.

But the particular matter of them is requisite to be understood, if the Physician would know accurately rately the proper Disposition of the vitious Humour, which offends by being predominant in the Sick; for then we are to make choice of such Cardiack Materials, as are opposite or contrary to that detected Vice, but this Doctrine is to be met withal in

the Semmeotical Part of Medicine.

Therefore where the Humours incline to an Alcaline Nature, then the Cardiack Materials are best found, in a thorough Decoction of frumentaceous Grain and Seeds, prepared with the purest Waters well boil'd, that from thence may be made Ptisans, Panada's Flummery, &c. the last of which is most recommended for Use: All these frumentaneous and leguminous Preparations are of greatest Service for the Diet of the Sick, together with Emulfions and Decoctions of Almonds, Rice, Piftachia Nuts, Poppy Seeds, &c. 2ly, Of mature, grateful, sharp or sweet Fruits, especially the succulent kind, or such as are preserv'd with Sugar, or converted into Jellies; as tart vinous Apples, ripe Quinces, Oranges of all kinds, Pears, Peaches, Nectarines, Apricocks, Prunes, Plums, Cherries, Mulberries, Raspberries, Currans, Strawberries, &c. 3ldy, From pulpy, soft Fruits, eaten raw, or pickled, as Cucumbers, Gourds, Melons and Artichoaks. 4ly, From milky olerant Herbs, as red Cabbage, Succory, Pursiane, Sorrel, &c. 5ly, The Milk of Animals during the Summer Pasturage, with the Whey, Cream and Butter-milk.

The Choice, Preparation, Quantity, Occasion and Order of administring all which are indicated from the Age, Sex, Constitution, Custom, Diet, Cause and Disease of the Patient, together with the Continuance and Symptoms thereof, the Season of the Year, Temperature of the Weather, and the

like are to be consider'd.

But if there be an acid Disposition found to predominate, then these Cardiacks are to be met with in the animal Kingdom, whose sirmer Parts are to be render'd apter for Nutrition by boiling in Water, to Broths, Jellies, &c. to this Head also, Eggs and those Things which arise from a various Composition of different Parts are to be refer'd; in the Use of which, all those things are to be observ'd, which have been before hinted.

If a muriatick Acrimony abound, those Things are convenient, which are described under the first Head of Diet, to wit, Corn, Fruits, Seeds, Herbs, &c. that are devoid of Salt and Vinegar; so likewise

where the acrid, oleous matter offends.

To the next Class of Cardiacks, those things are thought to pertain, which first, being applying to the flaccid Fibrils of the Vessels, and adhering to them, render them more rigid, fuch as are all these in which a moderate aftringent Virtue is commended, as Apples and Pears that are auftere, Quinces. Pomegranates; Fruits that are gently eager or tart. Horns, Shrubs, &c. as all the kinds of Myrobalans. Acorns, Barberies, Myrtle-berries, Acacia, Rofes, Services; Herbs as Cinquefoil, Tormentil, Burdock, Plantane, Purslane, Pimpernel, Bistort, &c. Flowers of Pomegranate, Roses; the Pomegranate Rind, Peruvian and Tamarisk Bark; Roots of Capers. Myrobalans, Juice of Acacia, and Sloes, Maffick, Frankincense, Dragons Blood, Gum Lac, austere Wines, &c. Earths or Metallick Bodies, as Bole, Chalk, Lemnian and Japan Earth, Allum, Vitriol and Iron or Steel. 2ly, Those things which joyn together the resolved or broken Fibres of the Body, fo as to make them one compact Substance one with the other; fuch as are all the forementioned, and efpecially those which are found to be very binding. as the aufterest Vegetables and Fossils, unripe Fruits. calcined Vitriols, calcined Bones, &c.

Such things are indicated to be necessary, when there is a great Weakness throughout the

whole Body, together with Paleness, Coldness, Stupidity, a serous Stench, and a remarkable Weakness

of the Body.

But in administring these things a prudent Caution is to be observed, especially upon the Consideration of Experience, from whence we know that austere things acting too much upon the first Passages, make it difficult for them to be convey'd into the internal Parts.

But the third Class of Cardiacks seems to consist chiefly in the most subtil and fine Part of sound, young, vigorous Animals, plentifully convey'd into the weak Body to supply the desects thereof, this appears to be done, first, From expiring Exhalations that arise from those Bodies, while they are apply'd to the sick Body, like that of Fomentation. 2ly, By sucking Milk from the Breasts of any Creature. 3ly, By taking the Gravy stewed from the Flesh of an Animal. 4ly, By odorous soft Vapours of Saffron, Jasmine, Citron, Orange Balm, &c. 5ly, By fragrant sweet scented Wines, sufficiently volatile and brisk.

These Cardiacks are known to be necessary, when the Strength of the Body is known to fail, and also there appears evident Signs of Languidness thro' all the muscular Motions, and likewise the Exercise or Use of the Senses is much impeded, but especially if there then appear evident Signs, the Humours being

gross and thicken'd in all the Vessels.

The last Class of Cardiacks will be found to be very large and numerous, and therefore ought to be subdivided to render them more easily understood. First, then they are the fresh Juices of all those Fruits, in which there is a grateful, sharp, penetrating, refreshing Taste, any sweet fragrant Smell, and also any Power of affording Nourishment: The first of these are Oranges both sweet and sour, ripe Pomegranates, fragrant Apples, Ananas, or the King of Fruits;

Fruits: Melons, Cherries, Strawberries, Mulberries. Raspberries, Currans, black Cherries, Prunes, Peaches and Nectarines, and many others of the like Nature. which are the best stimulating Medicines in hot and dry Weakness. 2ly, The diffusive Odours of the most fragrant Vegetables, as Orange Citron and Limon Peel; Flowers of Borage, Betony, Buglofs, Saffron, Jasmine, Lilly of the Vally, Galbanum. Balm, Myrtle, Sassafras, Hyacinth, Rhodium, &c. or the more acrid and hotter kind, as Southernwood; Wormwood, Amomum, Dill, Angelica, Annise, Mugwort, Cyprus, Calamint, Cummin, Coriander. Cloves, Cinamon, Cardamoms, Dictamny, Galingal, Hystop, Masterwort, Juniper, Lavender, Bays, Mace, Mint, Majoram, Marum, Mastick, Nutmegs, Penny-royal, Rue, Savine, Sage, Thyme, Ginger, &c. to which may be added the Gums of Ammoniacum, Bdellium, Elemi, Galbanum, Myrrhe Opopanax, Sagapenum, Afa fætida, Camphore, Storax and liquid Ambar. 2ly, Particular Odours that produce fingular and wonderful Effects on many, as are found in Ambergreece, Benjamin, Castor, Musk, Storax, and Civet. 4ly, From all these together, received and acting in the Body. sly, Here is a numerous Series of those things which strangely affect the Nerves, being endowed with a volatile, thin, acrid, flimulating Force or Virtue; and may be reduced, first, To Acids, as are Wines and Vinegars, as well simple as aromatick. 2ly, To things call'd spirituous, as are all simple, vegetable Spirits, prepared by Fermentation, or replete with the Odours of Aromaticks. 2ly, Simple, Volatile, Alcaline Spirits, or united to Spirit of Wine and aromatick Oils. 4ly, Distill'd, Aromatick Oils, or those by Expresfion. sly, Compounded ones of which there are without Number, according to the Pleasure of the Maker; from which Epithemums, Liniments and Medicinal Drinks are made, to these we may also reckon

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reckon simple and compound, distill'd, aromatick Waters, and odorous, artificial Balsams, simple and compounded Cardiack Confections, aromatick, oleous Spirits, volatile, oily Salts, aromatick and spirituous of various kinds; Tinctures prepared with Spirit of Wine, from the most fragrant Aromaticks, and many others according to every Man's particular Inclination.

In the use of all these, there is need of great Caution, for being administred to the Body, where the Humours lodge in the Vessels, not disposed to an easie Transmission of the Fluids, they excite a Motion which tends to sudden Destruction: There we must have regard again, to all the Cautions laid down.

This kind of Cardiacks is indicated from the want of a circular Motion of the Fluids, which Deficiency arises, from the Unactiveness only of the Fibres, together with the gentle Humours and Vessels apt for Transmission; but what single Species is to be chose, we are taught from considering the Nature and Disposition of the Disease, and the Cardiack to be administred. But now having done with the Diet of the Sick, we shall proceed to the Cure of a Disease.

ΠΡΟΦΥΛΑΊΣΙΣ ΘΕΡΑΠΕΥΤΙΚΗ, Or the Therapeutical Prophylaxis.

THE Causes of the Diseases being accurately known by their Signs, Indicate the Ablation or Removal thereof, therefore if they are consider'd to lodge in the firm or solid Parts they require, first, the taking away the destructive or injurious external Cause, or 2ly, the Union of the Parts morbidly separated, or 3ly, the Separation of the Parts morbidly

morbidly united, or 4ly, the Removal of the Super-fluous, or laftly, a Supply of what is wanting.

These Indications occurring or meeting together in the larger and more sensible Parts, require the Assistance of Chirurgery, which is wholly imploy'd, that by its Operations artfully perform'd by the Hand, or by the Application of Remedies, these five things mention'd in the preceding Paragraph may be compleated; as may be seen from the best Authors, Paraus, Hildanus, Solingen, Dion, &c.

But if they lodge in the internal Parts, they are to be oppos'd by other Remedies, altho' analogous thereto in their final Operations; amongst which since Poisons are the first, we shall first of all treat

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'ANTIAOTA, of Antidotes.

THE quickest Poisons taken into the Body, or apply'd to it, being made the Causes of Discases by their own proper Strength or Efficacy, or from Corruption, first brought into the insected Parts, indicate first, The taking away of the poisonous Cause. 2ly, The Correction of the Poison now received, or unavoidably to be admitted. 3ly, The Expulsion of it from the Body. 4ly, The Mitigation of the Symptoms. 5ly, The Arming or Desence of the Body, against the force of the Poison taken in or apply'd.

The Cause that spreads or diffuses the Poison, and communicates it to the Body, or mixes the Miasms to the Atmosphere, or being now apply'd to the Body, inspires the Miasms if this be known to the Senses, it is easily removed. First, By taking away the poisonous matter, and that first of all, by burning it out with large living Fires. 2ly, By correcting the Air, which brings to, and

conveys

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conveys the Miasms, which is best done by thick Vapours arising from such combustible Fuel, the Virtue whereof is opposite to the known Poison, as in the Plague, from caustick, alcalisate, putrid Vapours, the Fumes of Vinegar, Spirits of Salt, &c. in acid, poisonous Exhalations, the dissusing of spirituous, alcalisate Odours are serviceable. 3ly, By changing, dissipating and renewing the Air by a Wind made by Art, especially, if it can be transmitted by large Fires, according to the Art of Hippocrates. 4ly, By slying from it, or moving from a lower Situation to a higher or mountaneous Part. Lastly, by taking away or correcting that venemous matter, which is received in or apply'd to the Body.

The present known Poison is corrected by the Application of such things, which can render those Qualities of it unactive, with which it hurts the

Body.

Which first, are hitherto scarce known in many of them, except only from the poisonous Faculty hardly evident, unless by the Death of the Person insected. 2ly, They are discover'd in others by their wonderful, and not yet explain'd Effects. 3ly, In some, by those Effects that are to be met with in other remarkable Diseases. 4ly, and Lastly, They are understood in some sew from the first Reason, while from the known Nature of the Poison they are easily foreseen.

The former which are said to hurt the whole Substance, accurately indicate contrary Remedies, yet equally as little understood as those Poisons, as to the Knowledge of their Effects. These are properly call'd Antidotes, Alexipharmicks, Treacles, &c. and by the Greeks, artisora, artisor

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The Second Things faid to come from an occult Quality, in like manner, requiring wonderful Remedies call'd Specificks, scarce to be found except by mere chance, are refer'd to the History of Poi-

ions, from whence they are to be tetch'd.

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The Third before they kill, while they produce morbid Effects, with which the Fabrick of the Body is so broken, that in certain known Diseases they require, that such Medicines should be administred, which Physick hath been observed to avail in the healing of such Diseases, which distinguish themselves by the like Effects.

If Poisons are known to be apply'd to the Body, then there will be an occasion for administring those Remedies, which have immediate and ready force and Power to enervate and weaken the known Malignity; but these are however strong opposite Malignities themselves, and therefore as likely to do Mischief to the Body, except the Poison that was first

From whence we learn to know the Nature of Poison from natural History, and the Cure of Poiions, as well from Mechanical Science, as Chymical, and lattly, from the Effects discover'd by Anatomy. And Knowledge arising from hence judicates this.

And from that Indication is known the matter, Preparation, Dose, Application and Direction, or Go-

vernment of a corrective Remedy.

But the first and most common Antidotes almost against all Poisons, and therefore of the greatest use where the Poilon taken is known, but not the particular Nature of it, are these, pure Water a little more than Blood warm taken quickly, and for a time, or else injected into the Body; as also a weak Lixivium or Lee of common Water and Venice Soap, us'd in the like quantity, manner and time, or else simple Water with Soap and Oxymel, administred upon the

like occasion, sweet, fresh drawn Oils by Expression, from fat, farine or frumentaceous Seeds taken in good quantities, and that presently, or injected, or fat Broths made from the Flesh of Animals; especially the Vinegar if soon apply'd, and lastly Opium. But there is not hitherto known any General Prophylactick Antidote, but it is repugnant to it self.

In giving particular Antidotes, there is need of the greatest Prudence; for since these prevail by their singular Virtues to correct this or that Poison, they have notwithstanding a force or violence equally as great or greater, than that which they overcome. And therefore these meeting together in the Body, mutually destroy themselves become unactive, and do no great hurt; but if they are there singly, they are found to be equally noxious as the Poisons them-

selves, which they are administred to subdue.

But all these Antidotes whether universal or particular were, may and ought to be so prepared, apply'd and directed, that they may be ready presently and constantly by their uncorrupted Virtues, to pervade those places in which the Virus or Poison lodges, and there to conquer and overpower it: Therefore the Physician ought to have a Class or Stock of Materials always ready or at hand, which takes in all the Diversity of Applications, which are first, Air, Fumigations, a dry or moist Vapour apply'd to the Lungs; Draughts, Clysters, Epithemums, Baths, Fomentations, Injections for the Womb, Bladder, Jaws, &c.

Poison being receiv'd, is expell'd from the Body. First, By lessening the Strengthjos it in that place, by which it may be more safely discharg'd, where it is less hurtful, and passes out of the Body, and does less Injury to the Viscera; for then it is driven by the Vigour of Life and the Efficacy of Medicine, till it is forced out; and that is perform'd at this day by means of great, large Cupping Glasses,

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apply'd with a great deal of Fire, and often renew'd, by warm Fomentations and strong Emollients; by Leeches, Scarifications, Frictions, hot Things and Emplaiters. 2ly, By magnetick Attraction, by which the poisonous Body being drawn out by a fingular Energy, the Patient is deliver'd or freed from it; fuch as is faid to be done by the Flesh of venemous Beafts, the Serpents, Stone, &c. 2ly, From every Medicine that powerfully dilates and moves; fuch as are fudden Vomits, quick Purges, strong Sweats, and sometimes good Diureticks Whence Diascordium, Mithridate, Treacle, Orvietan and Opiate Confects are of Service; yet to which you ought to give less Credit than to Universal Therapeutick or Prophylactick Antidotes. 4ly, By applying to the Part affected with the Poison as soon as may be, lest it spreads, which is best done by an actual Cantery or a hot Iron.

The fierce cruel Symptoms of the venemous Effects growing more sensible, according to the Doctrine of Pathology, are not difficult to reduce to their Classes; and then they may be cured, as if they had been some particular Diseases, of which we shall

fpeak hereafter.

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The Body is fenc'd or secured against the Application of Poisons. First, By taking largely general and particular Antidotes, which are safe if beforehand, the Nature of the Poison is known against which we wou'd provide. 2ly, By anointing that Part of the Body which is more fear'd may receive the Infection. 3ly, By keeping all Parts in an equal Perspiration; but there is no such universal Preservative yet known, the there are many boasted of.

But what hath been hitherto said of Poisons, may be likewise understood of the Plague and other Contagions: But what hath been said, will appear more intelligible from the subsequent, and perhaps not X 2 useless

useless Compendium of particular Poisons and their

Antidotes.

For first, some Poisons may be refer'd to Things, manifestly acrid, but so that the Acrimony is singular, and yet caustick, creating a Gangrene and putrefying; fuch are Cobalt, yellow, red and white fublimate Arsnick, Realgar, the Armenian Stone, Lapis Lazuli: These internally or externally apply'd inflame, corrode and raise Pain, Heat, Dryness, first in the Places first hurt, and then in the whole Body, hence they create the most acute inflammatory Diseases in the Mouth, Jaws, Gullet, Stomach and Guts, procuring Nausea's, Vomitings, Dysenteries, Cholera Morbus and the Iliack Passion; producing a livid Paleness, from whence comes Vertigo's, Convulsions and Death, but avoiding the last, Palenels Palfy and Contractions, they indicate or declare the immediate use of warm Water, Vinegar or Honey, conflantly follow'd by drinking, injecting, bathing, &c. If it can be thrown out by Vomiting or Stool, that is better to be repeated often, fat Broths, Milk, Oil and Butter are profitable; after that, they require the daily use of laxative, soft, fat things, as well by the Mouth, as bathing or washing therein.

The like almost of these are from Vegetables, as Aconite, Anacardium, Anemone, Apocynum, Arum, Cataputia, the black Chamæleon, Colchicum, Crown Imperial, Cyclamen, Dragons wort, Spurge, Elaterium, Euphorbium, African Marygold, white and black Hellebore, Hermodactils, Hyacinth, Spurge laurel, Mezereon, poisonous Honey, Oleander, Ranunculus, Ricinus, Scammony, Oily Seeds being made acridly rancid by continual Decay, Tithymal and Thapsia; the Effects of which are almost the same with the fore-mention'd, but the Indication

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There are other violent and acrid Poisons, but yet which lodge as it were Viscous in the Stomach, and so effect the Brain and Nerves after a particular manner, as the Chrysomel, the great and lesser aquatick Hemlock of Gesner like Parsley, Henbane, Nux Vomica, Oenanthe with the Smallage Leaf, and poisonous Juice, Opium, Nightshade, &c. producing Vertigo's, Scotomies, Delirium, Madness, Nausea, Vomiting, Dysenteries, borrible Convulsions, Apoplexy and Death; they indicate the present use of a Vomit ready at hand, Water, Oil, Honey, the Acidulæ taken in great quantities, and a constant Repetition of them; Baths, Clysters, &c. the Disease being abated, strong Sweats by Treacles and often repeated,

then a fost, thin Diet.

There are acrid Poisons with a manifest Acidity; as to wit, Spirits of Salt, Spirit of Nitre, Aqua Regia, Aqua fortis, Spirits of Sulphur and Vitriol, the same Acids united with metallick Bodies, as a Solution of Gold and its Crystals; a Solution of Silver and the Vitriol thereof, the Lapis Infernalis; a Solution of Quickfilver in Spirit of Nitre, Spirit of Salt, Aqua fortis, Aqua Regia, or the Calcination thereof with Oil of Vitriol; and hence comes red, white and green Precipitate, sweer and corrosive, sublimate, Calx, Turbith, Mineral; the Impregnation of Antimony with Aqua Regia, and hence the escharotick Calx. From these arise horrid Tastes, acid, four Stenches, Inflammations, eating of the Flesh, gangrenous eschars Loathings, Vomiting, Dysenteries, dreadful, cruel Gripes, Heart burn, Iliack and Chollick Pains, Tumours of the Glands, Salivations, Syncope's, Death. These require Dilutions by aqueous things, blunting or sheathing the acid points by Oils, inverting them by lixiviate, foapy Alcalies, absorbing the strongest Acids; but then when the Violence is appeas'd, the frequent use of Oil and fat Broths, with the Emulsion of the cool, oily Seeds.

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There are other acrid Poisons known to be manifestly alcaline, and they are the Ashes of burnt Plants or Vegetables, made from thence into an Alcaly, as Lime-stone is by burning; Egg, Humours and Flesh it self putrefied together, and then the Salts separated from them, are made by Sublimation of the Fire. into fix'd Alcaly Salts, with Lime, Lapis calaminaris, Chalk, Iron, &c. but these create a quick, violent, fiery Inflammation, Corrolion, Gangrene, burning Pains in every Part, likewise unquenchable Thirst, Convulsions, the acutest Fevers, cadaverous Smells, intimate Dissolution of the Humours, Putrefaction of those and the Viscera, and lastly Death; but they require in order to a Cure, a Dilution by aqueous Laxatives; an Obtusion by oily, fat and unctuous Earths, an Inversion by diluting, volatile Acids, and afterwards a continued Diet of cooling, acid, oily Emollients.

Some are frequently esteem'd Mortal from a particular Acrimony, yet so that that Acrimony is scarcely otherwise manifest, than by its deadly Estect in Men, Brass, the Calx thereof burnt, the Calx made by Corrosives, Flowers, &c. Crocus of Antimony, the Calx prepared by burning, and the Glass of Antimony made this way, the Flowers made by the Fire, or made by the help of Sal Armoniack, and then wash'd. These taken inwardly procure Loathing, Vomiting, Dysentery, dreadful, cruel Pains of the Viscera, Spasms, Tetanus, Syncope, horrid Troubles and Death; they require for Cure diluting, emollient, obtunding Acids presently apply'd, and that for a time upwards and downwards, externally and internally; then Opiates, and oily Medicines.

There are also reckon'd six acrid Poisons, that are merely mechanical; the Diamond, Rock Crystal, Filings of Iron and Brass, plumous Allum and broken Glass; these prick the Nerves, wound the Vessels, excite Convulsions and Hemorrhagies, from whence come

come Ulcers and the like Mischiefs, they indicate the speedy and plentiful use of Oil and Butter.

Those are Poisons which destroy by sudden or slow Death from constringing the Vessels, thickning the Humours obstructed or drying them up; as quick Lime, Plaister, the Minera, Filings or Calx of Lead, Ceruse, white Lead, Glass, Lytharge; Fleawort Seed, Hip Spunge, Toadstools, Agarick, Birdlime, these conglurinate and constringe or bind the Guts and Vessels together, and create miserable Diseases after a wretched languishing Life, and at last Death; they demonstrate the necessary use of Vomits, Purges, &c. of spirituous Acids, oily, spirituous Alcaly's, all saponaceous Things, which are to be us'd

quickly and with some Continuation.

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In the last place, those are to be reckon'd Heteroclite. Poisons, that are Enemies to Life, yet whose Effects and Virtues have not yet been sufficiently explain'd and well observed, and which notwithflanding, by taking, Application, Stroke, Touch or Biting, occasion Death; as the Cantharides, Spider, Tarantula, Asp, Viper, Serpent, a venemous Worm call'd Dipfus, the Horn-worm, Scorpion, mad Dog, Toad, Lizard, the venemous black Beetle, Salamander, the Sea Hare, Sea Parsnip and the like, these produce certain, various, wonderful and unaccountable Effects: The Indication whereof is if internally taken, to evacuate presently by Vomit, but above all to dilute by Water, and foften by laxative, emollient, oily Medicines; and fuch as refift Putrefaction, as spirituous, acid and saline ones. If they act from an external Stroke, Bile or Application, then the Eduction of the Venom is indicated by the poisoned Part from sucking, scarifying, burning or rubbing thereof; and also promoting strong Sweats by penetrating Antidotes, that are Enemies to Putrefaction, by blunting the Venom by acid, saline, or other specifick Counterpoisons,

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There are some things which suffocate or choak the Patient in a moments time under the form of a Vapour, as the Fume or Smoke of Coals, the Damp of a Coal Pit, or subterraneous Air long pent up for want of vent: The Steam of sermenting Wine, the volatile Dust of a ripe Fungus Toadstool, or Puffrall, the Fume of Sulphur and the like; these may be understood from what went before, affect the Lungs and Nerves when apply'd to them, that they are scarce to be cured.

But the remote Causes of Diseases known to the Senses, are easily changed or removed, for they indicate an Alteration in the Six Non-naturals, but if the same are hid, or kept more close, yet being known by their mere sensible Effects; they indicate by these their Phanomena apt or proper Remedies.

For the Course of these Phanomena rightly observed, teaches us by what Assistance, Time, Order, Method and Way it is to be used, that the proximate Cause of a Disease in the human Body may be cor-

rected or expell'd.

But also it teaches us the accurate Observation of them, what is wanting, and what those supplemental things are which are to be administred.

And likewise what Motions are to be excited, supported, lessen'd or brought to Rest, in order to promote the same end.

Therefore the appointed and exact Knowledge of Effects teaches us exactly how to correct and re-

move the Cause.

From whence also is known, that hitherto there is a double way by which we are led into the Knowledge of the Cause, to wit, methodically or

specifically.

The methodical way, whereby the immediate Cause is known and taken away, makes use of these Helps or Assistances, first, accurately to explore and appoint the Phanomena, and diligently to observe

A healing Indication in the Diseases, &c. 313 observe the Course of Nature. 2ly, If Life is seen to languish or grow weak in the Performance of those things, which are required to drive out the Cause of the Disease, to have recourse to the Administration of Cardiacks, or by the Removal of those Impediments which hinder the Evacuation of the preternatural Malady. 3ly, But where the Actions of Life are perceived to rife too much, and therefore rather embarrass than relieve the Cause of the Disease, then such Temperance or Regulation is to be used, that they may be reduced to that degree of Strength as is here requisite; which is effected by aqueous, diluting, foft Laxatives and gentle glutinous things evacuating the material Cause of their Force, as Opiates, Anodynes, &c. 4ly, By acting or changing nothing at all, except what is evidently known to be done from a clear Indication.

But those Specificks, which remove the Cause of a Disease by simply applying them as such, gain the Appellations of mischievous Poisons themselves, as well as those of noble Medicines, as the Peruvian Bark in the Cure of an intermitting Fever, Opium of Pain and the like particular Antidotes that cure any particular Disease, by correcting, at-

tracting or expelling the Malignity.

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A healing Indication in the Difeases of a folid Part.

IF the Disease it self lodges in a solid similar Part, being known, it easily shows its own Indications.

For if it is united where a Solution or Division is required to the Cure, first, by taking away the foreign or dead matter, placed in betwirt the separate Parts. 2ly, The drawing them out mutually

to

314 A healing Indication in the Difeafes, &c.

not interrupting or diffurbing their Co-alition.

41y, Keeping them in a natural Moistness, Heat, and Sostness. 5ly, A Conglutination that is rendered natural by means of a moderate, found, li-

guid Nutrition.

The Three first are effected by the Hand of the Chyrurgeon, the Fourth by Balfams, Oils and Unguents, that prevent Putrefaction, Balfams of Tolu, Peru, Copayva, Mecha, native Turpentine, Butter, Marrow, Arcaus's Balfam, Ointment of Basilicon, Oil of Olive Linseed, &c. likewise Herbs and Plowers infus'd in Oils, &c. as St. John's Wort, Vervain, Marsh-mallows, Agrimony, white Lillies, &c. The Fifth is perform'd by prescribing a requisite or proper Diet to the Sick.

Too great Rigidity or Stiffness of the solid Parts indicates, there ought to be a Relaxation of them, which is obtain'd, first, from Fomentations, Baths, Liquors, Injections and Vapours of warm Water. 2ly, By the same means applying a gentle Decoction of emollient Vegetables, of Mallows and Marsh-mallows, Vervain, Acanthus, Pellitory of the Wall, Mercury, Fenugreck, Linseed and Quinces, Wheat and Oats. 3ly, Applying of soft Oils after the same manner. 4ly, By moderate Motion

or Exercise frequently used.

Too great Weakness or Relaxation of the solid Parts being known, indicates or requires the strengthning of them which is to be obtain'd, first, by Cardiacks as have been already describ'd. 2ly, From greater Motion than ordinary, apply d to the Body by Frictions and Exercise, that a little more Hardness and Callosity may be gain'd to the Part. 2ly, From a dry Heat. 4ly, From the like Diet and Ast.

From which it is plain, what ought to be done in an Encrease or Diminution of Elasticity; in too great A healing Indication in Difeases, &c. 315 great Weakness of a Fibre, or too great a Contraction or Distraction.

A bealing Indication in Diseases that corrects the Fluids.

THE Humours that are observed or taken notice of to be vicious in a Disease, indicate either the Alteration or Evacuation of them; and that either in the whole or in one affected Part.

A Vice or Depravity of the Fluid lodging in one particular Part, always shows either the Tenacity or Roughness of the Liquid, or else the ill State and Condition of the Solid, and therefore indicates the Change of the Passage as well as the

Matter.

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Matter that is lock'd up in a Place that hath too little Motion and is impassable, is restored, first, by diluting warm aqueous things, under the Form of Drink, Fomentation, Vapour, Bath or Injection. but so apply'd, that they may be able to remove the Obstruction in the nearest Part they can be to the affected Place. 2ly, By refolving faline Medicines in like manner administred; as Nitre, Sal prunelle, Sal Polycrefte; Nitre Stibiated, Sal Gem, Salt Armoniack, Flowers of the same, with a fix'd Alcaline Salt, Borax, the Salts of Vegetables, volatile Alcalies, soluble Tartar, &c. 214, By Sapa's from express'd Oils and fix'd Alcalies from express'd Oils and volatile Alcalies; from distill'd Oils and fixed Alcalies; the Galls of Animals and the Juices of the abstersive Plants; as Lettice, Succory, Dandelion, Sow-thiffle, Goats-beard, Taragon, Endive. 4ly, By those which are contrary to, and prevent any particular Coagulation, as by the Use of Alcalies when there is a Coagulum made by Acids, and in a glutinous Coagulation, from the Use of Sapo's: In a Coagulum from Rest, by the Use of Salts and Soaps. 5ly, By Cardiacks, saline, aromatick, oily spirituous things considered as stimulating Medicines.

An obstructed Course is made pervious, By opening the Passages with Drink, Washing and Bathing of warm medicinal Waters, with emollient and faline temperate Medicines, moderate, dry, moift or hot Friction or Rubbing of the Parts. aly, The same is made from the broken matter, together with the filled Vessels, by warming, forcening, and moving, as Putrefaction and Suppuration, and the Refolution of the whole Part affected into a Fluid, Pus or Corruption. This is done by the Meal or Flour of Oats, Linseed, Wheat, Pea's, Beans, Lentils, Fenugreck, &c. as also the emollient Roots of Mallows, Marsh-mallows, Vervain. Melilor, Leaves of Mercury, or wild Spinage, Pellitory and Figs; the Yolks of Eggs, aromatick acrid Gums, Ammoniacum, Galbanum, Opopanax, Sagapenum, fresh Butter, which are either form'd into Pultises, Ointments and Emplaisters: 21y, By opening the way for the matter thus prepared; by Section or Cutting with an Incision knife, or the Application rer edministrer of a Caustick.

The Vices of the Humours, offending in the whole Mass, first, according to the semeiotical Doctrine indicate the contrary Remedies; to wit, too much Fluidity requires Inspissating or Thickness, which is acquired, first, by a Diet prepared from the Gelly of Animals and Vegetables. 2ly, From a farine aqueous Drink that is not fermented, as Barley, Water, &c. 3ly, By Encreasing the Action of the Viscera by those things fore-admonished for that purpose. 4ly, By the proper Use of Cardiacks.

The Thickness of the Fluid, if it offends, requires Attenuation or Thinness, and this is procured, first,

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by Diet from Meats that are chiefly fluid and light. the Broth of Flesh boil'd with Garden Pot-herbs that are moderately attenuating, as Endive, Succory, Sallery, Cabbage. 2ly, From acrid warm Pickles. as Mustard, Cresses, Colewort, Water-cresses, Nafturtium, Horse-radish, with Pepper, Leeks, Garlick aly, From old, sharp, spirituous Malt and Onions. Drink, Wine, Hydromel, Brandy, &c. 4ly, By diluting Drinks, Baths, Injections and other affiftance of Water and Heat, or the Motion of Running, Exercise, Rubbing, Riding, Walking, &c. 5ly, By strong stimulating Sudorificks, Diureticks, Purging. Vomiting, Blistering, Mercurials, &c. 6ly, By forceable Resolvents, as the fix'd Alcalies, volatile lixiviate Salts, and those things which are compounded from them.

But too much Motion of the Humours circulated thro' the Vessels, in secenting or excerning the Fluids, indicates a Rest or Quiet which is procured, sirst, by removing that particular Stimulum which irritates the Fibres and raises that Motion, or else from correcting its contraries. 2ly, By lessening the whole Mass of Fluids. 3ly, By inducing Rest from Opiates and Anodynes.

The same Motion being too much abated, wants raising to a greater Force, which may be done, first, by removing the Obstacle or Impediment, by correcting and assisting Remedies. 2ly, By the Help of Attenuating and Cardiack Medicines.

The Acrimony of the Humours in general, also indicate in general the Reduction of the Acrimony to be more fluggish and unactive; and this is effected, first, from a constant Diet of those Aliments, that are almost tasteless and insipid, perfect Gelly, soft and oily, as Milk, Bread, &c. the Broth or Gelly of fresh young Flesh, made by Boiling and Expression fresh Fish and Flesh; wheaten Bread well fermented and fully baked, good new Almonds, Pistachia

Pistachia and Cocao Nuts, with the Milk of the latter, sweet Summer Fruits that are perfectly ripe. 2ly, By drinking of pure Water. 2ly, Rest and Ease of Body and Mind. 4ly, By diluting, watry, soft, mealy, emollient oily things made into Ptisans, Emulsions, Fomentations, Baths, Drinks, Clysters, Injections.

sly, By Opiates and Anodynes.

But the acid Acrimony requires its Correctives, fuch as are, first, Diet from Eggs, Flesh-meat, Fish, together with Pickles, determining the Humours to become Alcalifate. 2ly, Water-drinks or oily fat Liquors, as Brunswick Mum, Malaga, Canary and Spanish Wines, good old Metheglin, &c. Chiefly Rest, as long as there is any great Sourness prevails, afterwards an Encrease of Motion by degrees, and at last pretty strong, together with Chearfulness of Mind. 4ly, Such Medicines as absorb the Acid, as Crabs Eyes and Claws, the Bones of Fifnes, & Shells, Pearl, Coral, Chalk; fat Earths, as Bole, Lemnian and feal'd Earth, Lapis Hamatitis, Dragons Blood, Filings of Iron, &c. or fuch as convert the Acid into a compound, fost, permeable Salt, as the volatile, fixed, lixiviate Salts; likewife those that blunt the Points of the Acids, as fost oily Emollients.

Again, the alcaline Acrimony being discovered, requires, first, a Diet from the Milk of Animals fed with tender Herbs, the Whey and Butter-milk from the same, as also Summer Fruits. 2ly, Drink from Water or small Beer. 3ly, Rest and moderate Cold. 4ly, Medicines, which by destroying the Alcali, convert that into a soft, compound or neutral Salt, as are almost all the natural Acids, the acid Serum or Whey of Milk from Animals, Churn-milk, Cream, Oc. sothole from Vegetables, as Sorrel, Wood-sorrel, Cherries, Rasps, Berberries, Currans, the Juice of Oranges and Limons, Rhenish and Moselle Wines, Vinegar, Tartar and the Cream of Tartar, Tamarinds.

rinds, Acacia, &c. those from Fossils, as Sulphur, Vitriol, Salt, Nitre either simple or mix'd with other Bodies.

A muriatic Acrimony indicates, first, a Diet perfectly tasteless or insipid. 2ly, A spirituous, light, watry Drink that is a little acid. 3ly, Medicaments that are emollient, farinous, diluting and also lixivious, made from quick Lime. 4ly, Those gene-

rally which are opposite to Acrids.

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An oleous, aromatick, bilious, putrid, rancid Acrimony stands in need, sirst, of a Diet, from the insipid, tasteless, farinous, olerant, acid Fruits, with Meats that are very gentle Acidula. 2ly, Drink from Water and the most diluting Oxymel, or a Decoction of Fruits. 3ly, Rest and moderate Cold. 4ly, Medicines from Lixiviates that are gently warming, as Honey, Manna, Cassia, Sugar, the fresh Juices press'd or squeez'd from Summer Fruits; 5ly, Things that are generally contrary to Acrids.

Whoever understands aright the Fundamentals here laid down in this method of Healing, and hath likewise weigh'd and consider'd well the Works of Hippocrates and Galen thereon, may persectly understand the Medicines that are requisite to raise, promote, govern and absolve a Digestion and Grisse

both in acute and chronick Difeafes.

For these consist only in the Attenuation of the thick, the temperating the acrid, in opening of the obstructed Passages, in strengthening the weaker lax Parts, and relaxing the strong and rigid, as also in the Temperature and Regulation of Motion; that the Consent and Opinions of the Antients may yet plainly exist.

For from them we see what hath been the Boass in every Age, and especially from the Principals of the Chymists, if these Axioms are first diligently

consider'd from the Panacea.

320 A bealing Indication in Diseases, &c.

1. A Panacea acts not or performs its Virtue on a Cadaver.

But 2. requires the Motion of remaining Life, that it may be stirr'd up to the Exercise of its Power.

3. Also it acts not upon a Part of the Body perfectly dead, yet cohering to the whole, whether it be turn'd into Pus, Ichor or a Sphacelus.

4. But the Extension of its Power or Virtue

terminates in Life.

5. It restores not by it self the vital Liquids that

are loft or deftroy'd.

- 6. Neither the same being corrupted, does it reduce to a Natural Disposition, as for example, Pus, Corruption, a stinking Sanies, or the Matter of a Cancer.
- . 7. It restores not the solid Parts that are cut off, wither'd or consumed, either of Vessels, Viscera or Limbs.
- 8. Many and those various Diseases, may arise from one and the same simple, material, efficient Cause, if that is apply'd various ways to different Parts of the Body.

9. There may indeed only from the Motion of the Animal Spirits varied or diversified, many Diseases

arise, and be maintain'd, and increase.

while Life remains.

11. Lastly, from Spasms or Contractions singly,

Wind, small Prickings and Poisons.

He that weighs all these things truly, will clearly and evidently see, that there are many Diseases relieved or cured by one Medicine, but that no Medicine cures all Diseases.

But the Remedies hitherto observed to be most

universal, are Water, Fire, Quick-silver, Opium.

And practifing upon these chiefly, tho' endeavoring cautiously to hide'em, some have gain'd a great Name

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A healing Indication evacuating, &c. 321 to themselves, who were vulgarly believed to possess or be Masters of an universal Medicine.

From hence again, it is plain what are call'd corrective Medicines in Diseases, and whether there are

any universal ones.

A healing Indication evacuating from the Fluids.

Affistance Art indicates must be carry'd off, is to be evacuated by a double Passage. First, By natural Emunctories and Spiracles of the whole outward Skin of the Nostrils, Mouth, Jaws, Oesophagus, Ventricle, Intestines, Bladder and Urethra. 2ly, By artificial means, by Phlebotomy in the Blood Vessels, Arteriotomy or the cutting of an Artery, Scarifications, Leeches; by Causticks and Blistering in the Lymphaticks, and in all together, by Issues, Setons, Ulcers and Fistula's.

Hence the first Distinction of Evacuations, is taken from the diversity of the Emunctory, by which they educe the morbid Matter, but the other from the difference of Matter which is carry'd off by

iome particular Parts.

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Sudorificks.

Pirst of all therefore Sweat and the Matter of Perspiration is drawn out from the Body thro' the Skin; the Medicines which throw it out chiefly, are Hydragoges or Sudorificks; those which educe it in the second place are call'd Diaphoreticks, of which there is no great difference, but only in the degree of Action, such are all those things which move strongly throughout the whole Body. 2ly, Those which

in the interim likewise lessen the Resistance in the

exhaling Veffels about the Skin.

The first is brought about chiefly by drinking plentifully of warm Water. 2ly, Of fermenting Acids, or the diffill'd Spirits of Vegetables, or the most artenuated reiterated Distillations of subtil Fosfils; especially if these are drunk mix'd with warm Water. 2ly, With volatile and fix'd Alcalies, diluted with warm Water. 4ly, With all compound Salts diffolv'd in Water, to which we refer to Sapo's; also Crystals from metallick Bodies, or Salts joyn'd to them, or those metallick Parts that are much attenuated, and not too acrid, as Antimony Diaphoretick, Tachenius's fix'd Sulpbur of Antimony, Bezoardie Mineral, Mercury Diaphoretick, Crollius's Diaphoretick Gold, Cinnabar and many others of the like nature, which upon Examination are found either not to act at all, and then are call'd Diaphoretick, or else operate from a faline Acrimony lodging in them, and so often promote Sweating. 5ly, From Aromaticks endowed with an acrid subtil Acrimony, as are particularly Wormwood, Southernwood, Smallage, Afparagus, Anife, Angelica, Asarum long boil'd, Aristolochia, Gum Ammoniacum, Burdock, Water-cress, Betony, Carduus Benedictus, Calamint, Avens. Carni, Clove-gilliflowers, Cantaury the less, Cinnamon, Saffron, Camomil, Maiden Hair, China Root, Dittany of Crete, Liverwort, Agrimony, Mustard, Galingal, Gentian, Hyssop, Bays, Lovage, Horehound, Motherwort, Balm, Mint, Nasturtium, Origanum, Leeks, Pennyroyal, Rosemary, Rue, Savine, Sage, Sanicle, Sarfaparilla, Saffafras, Scabious, Scolopendria, Scordium, Thyme, Tanfy, Paul's Betony golden Rod, Nettle, Zedoary, and the Compounds made from hence; as Treacle, Diatesferon, Mithridate, Diascordium, Orvietan, and many others of the like kind.

Apophlegmaticks or such things as purge. &c. 323

But the other part of Sweating is perform'd by a neat washing or cleaning of the Skin, by Vapours, Lotions, Baths, Frictions. 2ly, From a Relaxation or Loosening of all the cutaneous and subcutaneous Vessels, which is happily perform'd by a Steam or Vapour of hot Water, apply'd to all the Skin of the Body but that of the Head. 3ly, By increasing of external Heat about the naked Body from the Warmth of a Bed, a vaporous Bath, burning Spirits, & By these means, insensible Perspiration, call'd a Diaphoresis, is gently promoted.

The Body is prepared for more easy and ready Exercise, and Labour if required, first, by Attenuation, and diluting the Humours. 2ly, From relax-

ing and opening the Veffels.

Sweat and a Diaphoresis are indicated in Diseases, first, from the Presence of the critical Sweat begin-

ning to eafe or relieve the Difeafe.

ally, From the Thinnels of the morbid Matter dispersing, or spreading it self thro all the Vessels, as in the Plague, the venomous Bite of a Dog, occur or the most subtil Case of the Venereal Disease, not yet fixed.

3ly, From the particular Temperament of the

Sick.

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4ly, From the known Epidemick Constitution.

sly, From various Obstructions, that lodge every where throughout the Body being resolved or loofen'd, especially in the subcutaneous Diseases, as Scab, Leprosy and Venereal Ulcers.

Apophlegmaticks or such things as purge Flegm from the Head, Nostrils, Mouth, &c.

A LL the Parts of the pituitary Membrane of Schneider, evacuate themselves into the No-ftrils,

324 Apophlegmaticks or such things as purge, &c. ftrils, and being distributed into various or different Cavities, secen a Mucus, falsly taken for the Pituite of the Brain; this and the humid Matter of the Eyes as well natural as lachrymous; as also the liquid Matter in the Coryza or stuffing of the Nose, being thicker in a pituitous Catarrh; and therefore this great quantity of Humours or Rheum may be discharg'd as well the by Strength of Nature as by Medicaments.

This Evacuation is indicated, first, from a Heaviness or Stoppage in the Head, a Coryza, Catarrh and Sneezing, while a Pus or Rheumatick Flegm drops thro' the Nostrils, with lachrymous or weeping Disorders of the Eyes.

2ly, From the Temperament of the Sick, finding

great Relief from the like Evacuation.

3ly, From a Revulsion made from the Lungs, in the Catarrh, Peripneumonia, Phthisick and Stop-

page of the Lungs.

This Evacuation is raised from a Fotus, Vapour, or a Decoction snuff'd up the Nostrils, sirst, of warm Water long boil'd with Emollients in them. 2ly, Of the same render'd a little more acrid with Honey or Sugar. 3ly, From a Decoction of Betony, Lavender, Marjoram, Rosemary and Rue. 4ly, From these very Herbs roul'd up when green and stuff'd up the Nostrils. 5ly, From every acrid Stimulum, as Sal Armoniac, Powder of Tobacco, Hellebore or Euphorbium; these are Errbines or Ptarmick Medicines.

This Discharge is stopt if too great, especially if a strong Sneezing and an acrid Running at the Nose attend, first, with warm new Milk, in which Mal-

lows are infus'd, fnuff up the Nostrils.

aly, By fost, gentle Fumigations of Benjamin, Mastick, Olibanum, Amber, Frankincense; or the milder Aromaticks, as Marjoram, Marum, and Pennyroyal.

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Sialogogs or Medicines promoting Salivation. 325

Besides if this Evacuation be too much used, it brings a pernicious Custom upon the Humours and the Parts.

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But since the Nostrils evacuate or discharge themfelves thro' the Mouth, and in that are the salivatory Ducts, the Tonsillæ and the Membrane of Schneider, the Indication sirst of all is to make Provision by Medicine, such as are Apophlegmaticks and Gargarisms.

Sialogogs or Medicines promoting Salivation.

A Large and artificial Salivation is indicated, first,

from such a Crisis.

2ly, From the particular Nature of the Disease lodging chiefly in the Glands and the adipous Membranes, but especially in the Cure of the Venereal Disease.

3ly, From the Nature of an Epidemick or Uni-

The Body is prepared by a large, sometimes continued Use of the attenuating, diluting, gentle, warm Decoctions of Scabious, Pellitory, Burdock, China, Sarsaparilla, Sassafras and Sanders.

The Evacuation is rais'd or promoted, first, by

washing or gargling the Mouth.

2ly, By a gentle and continual Massication or Chewing of any tenacious or tough Substance, as Mastick, Wax, Myrrh, especially if any Acrids are mix'd with those, as Pellitory of the Wall, the Leucanthemum of the Canaries tasting like Pellitory, Ginger and Pepper.

3ly, By drawing into the Mouth acrid and irritating Fumes, as Tobacco, Sage, Rosemary, Marjoram,

Mother of Thyme, &c.

4ly, But chiefly and most egregiously from the Use or Action of Medicaments, which create a Y 2 light

light but continued Loathing, as the taking of a little Antimony that is not much emetick, and com-

mon. Vitriol.

Parts of the Blood, change 'em into Lympha, and fo convert all into a Ptyalismus or Spitting; as crude Quick-filver, Cinnabar, a Solution of Mercury in Aqua fortis, white and red Precipitate, Turbith Mineral, Mercury sublimate, dissolved, &c. But the first of these together with warm bathing or rubbing of the Head, Neck, Shoulders and Face promotes that Action.

Too great a Salivation is abated or stopt, or at least mollified, first, by a large constant Use of the softest warm Drinks, as Decoctions of Mallows, and

Liquorice in Milk and Water.

2ly, By allaying the Impetus or Violence of it with foft, oily anodine Emulsions, adding prudently a

little Diacodium or Opium.

3ly, By revuling it into other parts by some strong Evacuation, especially Hydragoger that purge by Stool. Yet where there is need of the greatest Conduct, lest the Violence of the Motion of this Matter that is always acrid, should rush into other parts with more Danger; wherefore he that divides it best, can command it with greatest Safety.

Of Emeticks or Vomits.

Vomits are indicated, first, from the Stench of the Mouth in a moving, from a certain Bitterness like Gall in the Throat, Ructation, Loathing and Gnawing of the Stomach, with the Appetite falling off by degrees without any Fever attending or visible Cause.

2ly, From a spontaneous or natural Vomiting, together with great Easiness therein.

3ly, From

3ly, From the Nature of the known matter, whether agile or at Rest.

4ly, From the Place affected with Repletion and Obstruction beneath the Diaphragm, especially if that Affection be primary and nothing opposes it.

sly, From the General or Epidemick Nature of

the Disease.

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6ly, From the Constitution or Temperament of the Year.

Vomits are prohibited from the contraries of these, and the Body of the Patient is prepared for a more easy and safe Vomit, first, by returning the moveable matter by Dilution, Attenuation and Resolving.

2ly, By relaxing and lubricating the Passages by

emollient, oily fost things.

3ly, First by letting Blood, if the Body is too plethorick, or too vigorous and strongly agitated.

Vomiting is excited, first, by irritating the Spirits, from some conceived Idea that produces the greatest Loathing; or from some unaccustom'd or unusual Motion, as at Sea, &c.

Pharynx with a Feather dipt in Oil, or fomething

of the like nature.

aly, From drinking great quantities of hot Water

with Oil, Sugar, Honey or the like.

4ly, From any strong and viscid Acrid; as Flowers and Seeds of Dill, Asarabacca Leaves, or from the more violent ones of Cataputia, Spurge, Cyclamen, the Flower, Juice and Rind of Elder, Flower and Seed of Broom, both the Hellebores, Seeds of Nasturtium, Ricinus, &c. Bryony Roots, Orrice and Tithymal with Leaves of Tobacco.

5ly, From the Crocus, Glass and Flowers of Antimony, the Regulus, Substance and Insusion thereof, or the Emetick Wine, Mercurius Vitae, Tartar Emetick
Y A and

and the like, which perform various Effects accor-

ding to their various degrees of Strength.

6ly, From Mercury made acrid by Acids, in which also they are variously distinguish'd, as they more or less abound with acid or caustick Salts.

The choice Dose and Form of these are indicated from the Age, Sex, Temperament, Season of the Year, Idea of the Disease and the Matter to

be discharg'd.

It is promoted from plenty of warm soft Liquors, or Decoction of Carduus Sage, &c. drunk in quantities and repeated after every Paroxysm or Fit of Vomiting, and is stopt with a Draught of fresh Oil, Aromaticks, Opiates, grateful Acids, stomachick strengthening and corroborating things internally or externally apply'd.

Of Purgatives.

Any things can be evacuated into the Intestines, and therefore by this way there may be carry'd out of the Body, Saliva, Mucus, or Flegm out of the Mouth, Jaws Gullet, Stomach, both the Biles, the Pancreatick Lympha, the diluted or mucous Humour of the Guts, the black biliary Matter of the Blood, Viscera and Hypochondria, the serous Matter of the Blood as well as the purulent from some critical, Symptomatick or morbid Abscess.

This Evacuation is indicated, first, from a Flux

of the Alvus that is not colliquative.

2ly, From the offending Matter and the Place thereof.

3ly, From a repleted or obstructed Part under the Diaphragm.

4ly, From the particular, general or Epidemick Nature of the Disease.

sly, From Revulsion,

6ly, From

6ly, From the Signs of Digeftion.

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7ly, From the State or Condition of the Patient.

Purging is forbid or prohibited from the contraries, the matter to be moved is prepared, if there is occasion, from the same thing as the Vomit was.

It is raised, first, from things that dilute and gently stimulate, drank in great Plenty, when the Body is empty or fasting, in moderate Weather, the Waters call'd Mineral, whether Steel, Sulphur or Salt, are such, Whey, the ripe and fresh express'd Juice of Summer Fruits.

2ly, From lubricating things, and also such as stimulate by an easy Acrimony; soft, fresh, express'd Oils, fat Broths, emollient Decoctions, or the Extracts of them, Sugar, Honey, Cassia, Manna, Turpentine, Damask Roses, Gum Ammoniacum, Galbanum, Myrrh, Oppopanax, Sagapenum, taken in a moderate Dose.

3ly, From gentle Acrids, and also that are a little gross, therefore act chiefly in the first Passages, as Prunes, fresh Figs, Currans, Tamarinds, Myrebalans, Tartar, Rhubarb, Aloes, Polypody, Mercurius dulcis, &c.

4ly, From Acrids; as Asarabacca, Carthamum Seeds, Agarick, Mechoacan, Julep, Turpeth, Hermodactils, Sena, Soldanella, Dwarf Elder, Scammony, Diagridium, Peach Flowers.

5ly, From the most acrid or caustick; as black and white Hellebore, Gamboge, Spurge, Elaterium, Lapis Lazuli, Euphorbium, Mezereon, white, red, yellow and green Precipitate from Mercury.

From this almost innumerable variety of Compounds are form'd into Pills, Electuaries, medicinal Wines, Draughts, &c.

The Choice, Dose, Form, Preparation of which, are indicated, as hath been said before of Vomits, from the Nature of the matter to be discharged; from whence they take various Appellations, as enco-

RESTINE

loosening, Cholagoge, that purge Choler, Phlegmagoge, Flegm, Hydragoge, Water, Melanogoge, Melancholy, Pauchymagoge, or an universal Purger of all the Humour.

This Evacuation is promoted, by Salt, fat Broths, new Whey and the like; but is stopt by soft, oily, acid, astringent, opiate, spirituous Medicines, or else by Revulsion into some other Parts.

The Evacuation made of the Faces by Clyffers,

indicate these things.

First, From the place affected. aly, The matter to be educed.

3ly, From the Strength of the Patient and his Temperament, and likewise from the urgent necessity of the Evacuation.

4ly, From Dryness, Heat, and too great Motion

of the Humours in acute Cases.

freshment, requisite in the Fibres and in the acrid Humours.

Therefore Clysters are various, first, being only to dilute the Parts from Water, Whey, or fweet

Drink.

aly, They are emollient and lenitive from fat Broths, Oils, Decocions of the emollient Herbs, Milk, Sugar, Soap, Syrups, &c.

aly, The lighter stimulating Medicines, Salt Nitrous Water, Decoctions of the more gentle Purga-

tives, and Urine.

4ly, Acrid ones from Decoctions of the sharpest

Purgatives.

sly, The most certain Clyster, from the injected

Fume or Smoke of Tobacco.

Lastly, There are Suppositaries, which are made of acrid, stimulating things; Honey boil'd to a Thickness, Sugar, Soap, &c. which may be compounded with

with the more acrid and cathartick Remedies, as necessity or occasion urges.

Of Diureticks.

A N Evacuation or Discharge by the Urinary Passages is indicated, first, from Signs of Digestion.

2ly, From a critical Flux of the morbid matter by

the Kidneys.

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2ly, From a peccant Saline, lixiviate, subtil earthy, scorbutick, purulent matter.

4ly, From the Place affected.

5ly, From the Epidemick Constitution.

6ly, From the Temperament of the Patient accu-

stomed to this kind of Evacuation.

It is prohibited from the contraries, and is excited by the use, first, of great quantities of Water or watry things.

aly, Of alcaline, fixed, volatile, fimple or com-

pound Salts.

Salt, Sal Gom, Nitre, Borax, Alum, Tartar, or teflaceous Powders, mix'd with the Acid in our Bodies; so likewise the Liquor of Cockles and Onfters.

4ly, From the four animal Humour, Whey, and

Butter-milk.

sly, From the vegetable Fruits of Oranges, Limons, Rasps, Cherries, and the thin Moselle and Rhenish Wines.

6ly, From the acid Spirits of Vinegar, Nitre, Salt, Sulphur, Alum, Vitriol, either simple or compoun-

ded.

Oly, From vegetable Roots of Smallege, Asparagus, Carrot, Eryngo, Onion, Parsley, Fennel, Butcher's Broom and Saxifrage, the Fruits of the bitter Almond, and the Peach and Apricock Stone; or lastly, certain

332 Menagogicks or Evacuations of the Menstrua. certain Compounds prepared from some or all of these.

Diureticks are affished by an empty Stomach, an easy Digestion, gentle Motion of the Body, cold Air, provided there be warmth in the mean time in the Loins, Hypogastrium, Pubes and Perinaum.

Evacuation of Urine is stop'd or allay'd by the use

of mucilaginous, foft Emulsions.

2ly, Aftringent and corroborating Medicines.

2ly, By Opiates.

4ly, From a Determination into other Places, but especially from Sweat, rais'd and continued sometimes by Motion or Sudorificks.

Menagogicks or Evacuations of the Menstrua.

A N Evacuation of Menstrual Blood, or in Child-bea-

2ly, From a Pletbora.

3ly, From whatever Disease is derived from it,

and its Symptoms; as first, in Child-bearing.

It is exercis'd or perform'd, first, by determining at the Womb, with Fomentations and Baths of Feet and Legs, Frictions often us'd on the Feet, Legs, Thighs, Hips; by Cupping Glasses apply'd to all those and often repeated; by letting of Blood in the Veins of the Feet; by Emplasters of the fætid Gums laid to the Navel, Thighs and Legs, &c.

aly, By opening the uterine Parts and Vessels by Baths, Vapours, Fomentations and Injections, and the Application of Internals, as Birthwort, Motherwort, Calamint, Cardiaca, Dittany, Lovage, Marjoram, white Horehound, Mint, Penny-royal, Rosemary, Rue, Savine, Tansey, the fætid Gums, Aloes, Myrrh, Sassron, Borax, Steel, Amber, volatile, alcaly Salts, distill'd, aromatick Oils, &c.

Remedies, which are opposite to the particular Impediment of Evacuation, which are only to be found in proper single Signs in every Species.

The Evacuation is to be stopt, if it hath ex-

ceeded.

First, By Revulsion.

2ly, By Confiriction or binding of the Vessels.

aly, By Opiates.

Of Phlebotomy.

THE letting of Blood within such a Compass, as not to impair the Strength, first, lessens the quantity of the Arterial and Venous Fluid.

2ly, It makes the Resistance of what is moved,

less.

3ly, And consequently a Fullness of the Vessels, so that they mutually compress each other.

4ly, Hence from the distended Vessels, the Con-

traction or Elasticity is restored.

5ly, It rarefies the Fluids. 6ly, It renders them free.

7ly, It resolves and loosens them.

8ly, It prevents Obstructions.

9ly, Promotes the Circulation, Secretion and Excretion.

10ly, Abates the violence of the Blood's Motion.

11ly, Cools and allays.

Hence Blood-letting removes or takes away so many different Diseases, yet produces wonderful Changes.

It is indicated, first, from too great Plenty.

2ly, From too great Resistance given to the Heart

by the Humours.

3ly, From a suffocating Motion by too much swelling, from a Quantity or Rarefaction rais'd in the Arteries.

4ly,

4ly, From a suffocating Motion, beginning by too much Extension of the Vessels, in which the very Elasticity of them is destroy'd.

5ly, From the Blood being too denfe. 6ly, From the fame uniting too close.

7ly, Or thickning too much.

8ly, From those things which are Signs of an inflammatory and great Obstruction, found every where in the Body, being first discover'd by Pain, Swelling, Redness, Heat and Trouble, when at the same time Sweat and Urine are suppress'd.

9ly, From too great Motion of the Humours thro'

the Vessels, or contrarywise too slow a Motion.

roly, From too great Heat throughout all the

ved into any one particular Part; as in Hemerrhages and Fluxes.

12ly, From known Epidemick Causes.

13ly, From Age, Sex, Diet or Temperament.

14ly, From a Cachochymia.

15ly, From affifting the Entrance of Medicines into the Vessels, and also procuring a Mixture thereof, as likewise of exciting or stirring up the strength and force of them in performing the greatest Cures.

Blood-letting is the beft, in cutting a large Orifice

firft.

2ly, In a free large Vein, easily discover'd, at a

distance, from Nerves and Arteries.

3ly, In accelerating or quickning the Motion of the Blood, while it flows by a strong Respiration.

4ly, By the Motion of the Muscles about the Vein

that is open'd.

sly, From the Patient's lying.

Preparation is made for the easier Administration thereof, first, from Friction or rubbing the Part.

2ly, Fomentation.

It is prohibited in many Chronick Cases, in which many Obstructions and little sluid Blood remains in the Vessels.

2ly, From Age.

2ly, From Temperament.

4ly, From the known Nature of the Epidemick or Endemick Disease.

sly, From a Criff now otherwise made.

oly, From the small quantity of red Blood, and the Weakness of the Body.

7ly, From a fresh Delivery of a Woman in Child-

bed.

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From whence it appears of what Damage to Mankind this Remedy is, if it be either always or never to be administred, according to the Opinion of Helmont and others.

Blood to be taken from the Hamorrhoidal Vessels

is indicated.

First, From a melancholy Disposition.

2ly, From Diseases, wherein the Fancy or Imagination is affected.

3ly, From an usual Flux of those Vessels, which

are suppress'd.

4ly, From an Irruption of Blood by new ways which used formerly to be successfully evacuated by the Hamorrhoidals.

Blood is to be drawn, first, by mollifying the Veffels with warm Fomentations of Water, Oil, Honey, the Emollients of the Clyster kind, Vapours, &c.

aly, By opening the Veins by Leeches, &c.

3ly, By the use of Aloes.

Searifications act by stimulating and evacuating the Fluid, but Setons and Fontanelle's or Issues, by a slow-er Pain, stimulate and prick the Genus Nervosum, discharging of Serum, and giving a vent to too great Fullness; hence it is plain, where, and when they are indicated.

Medicaments that are stimulating create Pain, Heat and Redness, from an united Motion in the Nerves, and act by a Determination into Places they are directed; from whence certainly they perform the most infinite, and those often the most desirable Effects.

These are commonly understood, sirst, by strong sticking Plaisters, which being apply'd to any Part, lodge there, till the Part affected reddens, smells and burns; such as Pitch, Bitumen, Castor, Vine Ashes, Galbanum, Pepper, Pellitory of the Wall, Sal Armoniac. 2ly, Mustard-seed apply'd like Poultise, and lest on till a red, hot, itching Tumour appears; so Briony, Garlick, Nasturtium, Squills, Euphorbium and Crowfoot. 3ly, Blisters which are apply'd in the same Form as the former, produce violent Essess. 5ly, Potential Causticks, as lixiviate Salts, Lapis infernalis, sublimate Mercury, &c. which raise Instammations and Eschars; lastly, an actual Cantery of burning Iron.

A Palliative Cure.

BY mitigating the Symptoms, there is always something taken away of the primary Disease; from curing all the Symptoms together, the Disease it self is almost intirely cured.

But first of all, we are to consider Thirst, Pain, too much waking or want of Sleep, and the Lipo-

thymia, or Fainting of the Spirits.

Thirst, from a Dryness of the whole Body is quench'd or abated, by a large, frequent Draught of Water, Beer, or some grateful Decoctions mix'd with a little Acid, as Barley Water, Whey, Milk and Water, small Punch, &c. thin Water-gruel, Chicken or Veal Broth without Fat; so likewise Baths. Fomentations and Clysters, are useful.

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Thirst, from the Dryness of some particular Parts as the Mouth, Tongue, Throat, Gullet, is relieved, first, by the use of the foregoing things. 2ly, By washing and gargling often with the same. 3ly, By opening the Glands and Salivatory Passages by Epithemums and Fomentations, of laxative, moistning, and aperitive Remedies.

Thirst, From a lixivious, acrid Salt, or from an aromatick acrid is cured by all these, especially those of the diluting kind, but chiefly if the acid and nitrous are mixed with them; from whence we may know how to appeale that which arises from a muri-

atick Salt.

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But if Thirst arises from an uncommon matter, as swimming, &c. it is to be removed by diluting and resolvent means.

Pain is to be allay'd as a Symptom first, by diluting the Acrid which is done with warm Water, Water-gruel and the like, apply'd by way of Drink, Fotus,

Clyster or Bathing,

2ly, By loosening or relaxing the nervous Vessels, by drinking, washing, bathing, or Injections of moistning, loosing Anodynes that are gently aperitive.

3ly, By correcting the Acrid it self with proper

Remedies.

4ly, By freeing or fetting the obstructed Acrid at Liberty, from the too great Pressure of the Vital Humour.

sly, By mollifying, digefting and depurating the

obstructed Acrid.

foly, By blunting the Senses with a Numbness, by the internal Administration or external Application of Narcoticks; such as are first of all the most gentle ones of the Flowers and Seeds of the Corn Poppy; Lettice, when full of Milk in the Summer time. 2ly, The ripe Heads of the Garden Poppy, gather'd be-

fore the Seed is dry; the Milk that drops from the Europæan Poppy. 3ly, The stronger Narcoticks of Theban and Oriental Opium. 4ly, The strongest and most deadly kind, as Mandrake, Nightshade, Water Hemlock, Stramonium, or prickly Apple, Henbane, Tobacco and the like; from all which are made external Applications, as Fomentations, Stoopes, Emplasters, Cataplasms, &c. internally, Waters, Tindures, Syrups, Pills, Confects, Opiates, as Diascordium, Venice Treacle, Mithridate, Orvietan and many others.

Too much waking that seizes the Brain it self, causes that great difficulty by which means they never go to rest; except the Disease that first seiz'd the Head be removed, as is plain in a Frenzy, Coma,

Melancholy and Madness.

If they proceed from too great Drynels, they are relieved by Diet Drinks, Baths and Injections, from emollient, laxative things, made use of for some time; of whick kind, Mallows, Marsh-mallows, Violets, Lettice and Succory are preferable-

If the Symptoms arise from any particular Acrid,

they are taken away by the Cure of the Acrid.

But if it happens that the Humours are strongly and too rapidly thrown into the Brain, the Cure is perform'd. By things that appeale or abate the Symptoms. 2ly, By Applications of Fomentations, Baths, Blisters, &c. to the lower Parts; these are compos'd of Emollients and Acrids mix'd together; as Wheat, Barley or Oat-meal, Salt, Vinegar, Leeks, Garlick, &c. likewise Fish, and raw Flesh of Beef, live Pidgeons and the like. 3ly, Repellers apply'd to the upper Parts more immediately affected, as Vinegar alone, or made with Elder, Roses, Violets, &c. Oyntment of Populcon, the Anodyne Oils of Nightshade, Violet, Poppy and Hembane.

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Mot Solid dy 1 Internal Opiates may be scarcely used in this Case, except the Disease proceeds from too great Motion of the Spirits, in which condition Regard must first be had to Evacuation and Dilution.

The Excretions being too large are stopt by those things, which promote the Evacuations another way,

in the Nature of Revulsion.

Too great an Excretion of Blood by the Arteries being wounded, or the larger Veins, is stopt by Compression, binding, burning or searing up the Mouths of the Vessels, inspissating or thickning the Fluid, and the Contraction of the Solid; where Spirit of Wine, and atherial Spirit of Turpentine is, be considered in the first Place.

Lipothimia's or Faintings arising from the stagnant Humours, and from spasmodick Pains are cured by diluting and relaxing; but if they proceed from the Vine of the torpid Spirits, then by stimulating Cardiacks: If from Evacuation they are cured by Repletion; if from Hysterick Suffocation, then by setid

Anti-biftericks.

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The Conclusion.

WE Have hitherto treated of almost all Sorts of Medicines, answering to all the several Causes of Diseases, it remains now that we shew in what Order and Method they should be applied to every Intention of Cure, but as Medicines in general, so the Foundation of Practice turns upon the Motion of the Blood, and the Disposition of the Solids, which not only at all times defend the Body free from Corruption, and falling to decay, and so consequently maintains Life, but also expells those

those Causes that are Enemies to it, and the mor-

bid Affections thereof.

Hence it was the Antients term'd Nature the best Physician, this Experience confirms, while the vulgar and those who use Physick or Medicines without Art, only consulting Nature free themselves from many Diseases; hence it comes that the common People have better Success, from making use of the simple Decoctions and Insusions of Herbs and Roots, than the labour'd Chymists with their vain, boasted Arcana's, which frequently disturb the salutary and critical Motions of Nature, rather than

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promote them.

The Instrument of every Disease is nothing but Motion, which is increas'd in the System of the Fibres, from whence Spasms arise, or else in the Vessels from whence the Fluids are driven swiftly thro' them, and procure Fevers, notwithstanding nothing is a greater Enemy to Life, than the Stass and Rest of the Fluids, for this tends to Corruption, whereby the whole Body or a Part of it dies, therefore Rest is diametrically opposite to Life; but by the increase of Motion the stagnant Humours are resolved, and return to Motion, the Obstructions are removed, and by the Vital Circuit in this Motion, driven thro' their proper E-munctories.

But at the same time we ought not to imagine, that there is any Knowledge or Conduct conceal'd in the moving Fibres, which points out the Seat of the morbifick Cause, and according to the degree or proportion of that, institutes and appoints certain Times and Seasons, and directs us to them; such a Supposition is groundless and unnecessary: But this human Machine is so artfully framed, that it is stirr'd up or excited to Motions and Actions of a different Nature, by means of its Fibres, which instrument

instrument of Motion is systaltick, from which afterwards according to the Laws of Mechanism, result various Symptoms and preternatural Affections

throughout the whole Body.

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Therefore in that the Wisdom of the Creator is to be admired, that those preternatural and morbid Motions produced from other Causes in the moving System of the Fibres, should sensibly afford Relief and Help to the Body, defend it, and at the same time serve to expell the morbifick Causes; so that those morbid Motions not really by themselves, but by accident become salutary, and from a thing evil in it self produce a good Effect.

But there are in the whole Spalms and also Fevers of that Nature, that they perform a salutary Effect on the Body, while they remove and take away that which is offensive and troublesome to the Body, either in Quantity or Motion, too much Fluid, a Stass contracted, and Putresactions are

dangerous to Life.

Now if the Blood be preternaturally increas'd, it excites or raises Contractions by distending and pressing on the Fibres, or it increases the Tone and Motion of the Fibres, which is contractile and proper to the Fibres; from hence the Pores and Vessels are clos'd and tyed up by the Contraction, the excluded Blood is driven forward with force to other Parts void of the Contraction, the Quantity of which afterwards, too much distending the Vessels, breaks forth, and so the Blood is thrown out with great Relief to Nature.

Such an Evacuation of Blood is call'd critical and bealthful, nor is it so without any reason, for it lessens the quantity of Blood, which threatens the Body with a Disease, for this reason, the Menses in Women, the Hemorrhoids in Men are counted

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Salutary,

falutary, and ought not to be impeded or stopt by

the Physician.

When a Quantity of Serum flows, and that being falt and impure is obstructed in Perspiration, Spasmodick Contractions are made in the Habit of the Body, and the whole Mass of Humours repell'd to the inward Parts; from whence by a large Flux of Humours the Mouth of the Glands are relaxed, and so abundance of vitious Serum is evacuated with Advantage; hence fore Mouths, Cough and Catarrhs, prognosticate Health, because they free the Body from a Superfluous, Salt Serum.

Plenty of acrid Bile and Lympha, thrown upon the Guts and Stomach, or of acrid viscous Humours, excites vomiting by offending the nervous, muscular Tunicles of those Part, or else a critical Flux, which is not stopt without some danger. The Lympha being very acrid, caustick and putrid in the Small pox, or something milder in the Measles, and likewise the wiscid Tartar that is in Rheumatick Diseases, disturbs the whole sibrous and muscular Genus, and inwardly produces strong spasmodick Constrictions: From whence we have Heart-burn, Vomiting, Diarrhea, Trembling, Cold, &c. but these dismal Symptoms will disappear in the Spasms of a Fever, wherein the Excretions are perform'd vigorously.

In Inflammations, the Blood being pent up in the Vessels, hinders the Freedom of Circulation, where sinding no way to return, it distends the Vessels and presses upon the Fibres; from whence in the first place, comes a Spasm, by and by from the Spasm a Fiver, which in like manner, successively resolves Obstructions in the Parts affected, loosens the Coagulation of the Blood, and so frees the Body from a great Oppression; but all acuter Pains have for their Attendance a severish Commotion in the Blood, which

after-

afterwards are reliev'd by giving a free Circula-

From these things we may be sufficiently taught and instructed, that Nature is the best Physician; therefore in her method of Cure, she hath always regard to the Parts first affected, and 'tis the Physician's Business to follow that Rule, and by no means hinder, but rather forward her laudable Designs, at least imitate them; for the Physician is not Master but the Minister of Nature, she is Di-

rector, he a Servant.

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But this ought to be observ'd in spasmodick and acute Diseases, to carry off the vicious Matter, if it offend in quantity, or fwell the Parts, which may be done at first without diminution of Strength by Phlebotomy, Purgatives and Emeticks, which are to be prudently and sparingly us'd in the Termination or Ending of a Disease, but not to be neglected upon the first Accession; for it is much easier to relieve Nature of a Burden that hath been but just laid upon her, than assist her when the Disease hath had its full Scope; from whence the correcting of a vicious Quality is of great difficulty; for there are but few Medicines, that will change the Nature and Substance of the offending Matter; but the Humours are to be diluted and thicken'd, from whence too irregular a Motion is to be allay'd and temper'd; and Evacuation is much better promoted by a mild and gentle Motion; for if Nature is deficient in expelling, or if it is weak, then she is to be corroborated with Analopticks and stimulated by Alexipbarmicks and Cardiacks, which ought to be done about the critical time of Excretion.

This method chiefly obtains in acute Fevers, when there is no contending with multiplicity of Medicines, but Patience, Observation and a prudent

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Regimen

Regimen avail more than all the pompous and labour'd Preparations of the Shops. 'Tis a wife and antient Saying, that the Physician ought to be either a Spectator, an Affiftant or Actor in a Difease, or at least he ought to imitate Nature if

possible.

He ought to be a Spectator in acute Diseases, where the offending Matter is not so malignant, but the Vigour of Nature gently performs the Secretions; so small Pox, Meassles, Catarribs, gouty and rheumatick Fevers, St. Anthony's Fire, Diarrhea's and other Excretions, do not always require the Physician's Affistance, but they are often successfully cured by the Strength of Nature; here she prevails over Art, so that the latter wou'd rather interrupt than affish her in a Work of her own Power; therefore it is better that the Physician be here a Spectator, than too busy an Actor.

But when the offending peccant Matter is of a worse and more malignant Nature, so that it raises symptomatick Commotions in the genus nervosum, that the Excretions of all kinds are disturbed, then Nature is to be affisted; which is to be pursued till the ill quality of the Matter be temper'd, corrected and sitted for a Discharge or Evacuation, and the irregular frustraneous Motions quieted and allay'd; such as these are which frequently happen in all kinds of Spasms, instammatory Pains, pe-

riodical and malignant Fevers.

A Physician ought to imitate Nature, if she be slothful and unactive, or else there be a Deficiency in Motion and she is not able to perform her Functions, that is, if there be a preternatural quantity of Blood and Humours, then Phlebotomy is profitable for exciting the Motion of the Fluids and increasing the Secretions and Excretions, and this ought to be done in Pleuresies, Angina's, erysipelated

ry, Palfy, Convulsion, &c. where the Physician's Skill and Application is needful, Nature not being

fufficiently able to help herself.

Tis observable in general, that Nature in acute Diseases, and in the Paroxisms of chronick ones, performs more than Art, but Art excels Nature in removing the chronick. Now if I should fix upon a Class of those Medicines which are most efficacious in curing chronical Diseases, it would appear plain, they relieve no otherwise than as they increase the Motion in the Fluids and Solids of the Body, and render them more intense.

These things are exemplified in the Decoctions of the Resinuous and Alexipharmick Woods and Roots, and in some Preparations of Mercury and Antimony, which being apply'd with a judicious Hand, happily and successfully break the Force and Virulence of the Venereal Disease with its

worst Symptoms.

And there is no other Cause than this, that these Medicines act upon the Solids, that is, the moving Fibres, by stimulating the Motion of the Fluids thro' the whole System of the glandulous Pipes; so Obstructions are removed, the tenacious viscid Matter discuss'd, and the putrid Sordes or Filth of the Body evacuated by the salivatory Glands and the other Emunctories. Medicines from the vegetable, alcalious, volatile Salts and Spirits work kindly with Nature, because they assist the Motion of the Blood and Humours, and push them on to their necessary Excretions; so the lixiviate, bitter and balsamick relieve Dropsies and Oedematous Tumours.

The Effects of the Acidulæ and Bath-waters are wonderful in dissolving Obstructions in the Hypo-choudria's; in removing viscid piruitous Asthma's, Arthritick

Arthritick and Tartarous Diseases, but this Operation depends only on an intenser Motion, which they introduce into the Fluids; the mineral Particles of the Water simulating the Emunctories and Strainers of the Glands. The Use of Chalibeates, is not of the least moment in Affections of the lower Region of the Belly, and where the Force and Strength of the Viscera are loft, and there is a Stoppage of Blood and Serum, nor is it according to the Opinion of some that Acrids perform such Cures by absorbing the vitiated Serum, and precipitating the Falls, but it is done only by the Increase of Motion which they bring to the Fluids, from whence, by the Use of them, the Pulse is made quicker, the Face more lively in Colour, and the Appetite is strongly raised.

Emeticks circumspectly administred, relieve obflinate Diseases, not only by Evacuation, but by
that Commotion they raise in the Genus nervosum,
by which means it comes to pass that the peccant Matter is disturbed and removed from its
former Lodgment; so strong Catharticks if they
agree with the Body, make the Pulse quicker,
increase Heat, and produce an Intensences of

Thirft.

From which things it is clearly manifest, that the Physician ought to administer and dispense his Medicines purely mechanical; for where the Motions proceed well and regularly, they are to be continued so, and not disturbed; if they are too strong, they are to be moderated; if too weak and languid, they are to be rais'd and encouraged, on the Management of which the Foundation of Practice turns.

But further Experience teaches us, that Spring and Summer time when the Air is serene and temperate, gives much more Assistance to the Cure

of Chronicks, than Autumn and Winter, because the Motion of the Blood, and the Excretion of the superfluous Humours is then greatest; such Observations as these wonderfully second the Operations of Medicines, which is made under a languid Motion. But the Antients us'd wisely to take notice of a good or bad Constitution, and to proceed accordingly; a good Constitution proceeds from the Strength and Vigour of the Fibres and a due Perspiration; a bad one from the difficult Procedure of the Excretions, a Want of Strength,

or the Viciousness of the Fluids.

That Physician errs who preposterously stops the falutary Motions of Nature, which are endeavoring to perform their own Work, fuch as are made from a quantity of matter secerned, so likewise when he thickens the Humours and lessens the Excretions; for which reason 'tis wonderful to obferve how much Physicians mistake in giving Anodynes, Opiates, Steels, Aftringents and other incraffating things. They offend against common Reason, who, where the Motions are excessive, use strong Sudorificks and stimulating Evacuatives; they are notoriously to blame, who, where Strength is deficient, exhaust it the more by Purging; and those are equally blameable, who, in an apparent want of Blood, use Phlebotomy, &c. nor are those to be commended, who have not that due regard to Plenitude, as to make necessary Evacuations, especially in the beginning of acute Difeases and out of the Paroxysm in Spasmodick, as Convulsions, &c.

They are liable to the same Censure, who, before Evacuation, treat the *Plethorick* and *Cachymick* with forcible Medicines that raise Commotions in the Body, and those who use *Astringents* where there is a great Torture and Contraction of the Fibres,

who

who in great Solutions or Relaxations of the Tone,

apply cold, moift, nitrous Medicines.

They who suppress critical Excretions, either by internal cooling Anodynes, or else stop the Pores by external Astringents, are as ignorant as they who in the Hemorrhoidal Fluxes, and the Menstrua have no regard to Circumstances. They who in acute Difeases, go too precipitately to work, not observing critical Times and Seasons, they compel Nature to Excretion.

But they offend most of all, who use great quantities of Medicine where sew will do, for these neither understand the Disease, the Patient nor the Remedy; for there are but sew that a Physician need to use, nay very sew, whose Virtues and Dosses are truly known and thoroughly try'd, therefore he ought to take heed that he apply but sew,

and that those be choice and well prepared.

They mistake the Matter wide, who in Healing have not respect to the first Seat of the Disease, and they as little in the right, who know not how prudently to correct the vicious Disorder without injuring or destroying the Tone of the Stomach and Intestines; lastly, they must be thought unworthy the Name of a Physician, who cannot distinguish the Symptoms from the Disease, and know what things are done by Consent, and what are the Effects of the morbifick Causes, but proceeds to cure palliatively, by attempting to remove the Essects, without understanding to eradicate the Cause.

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